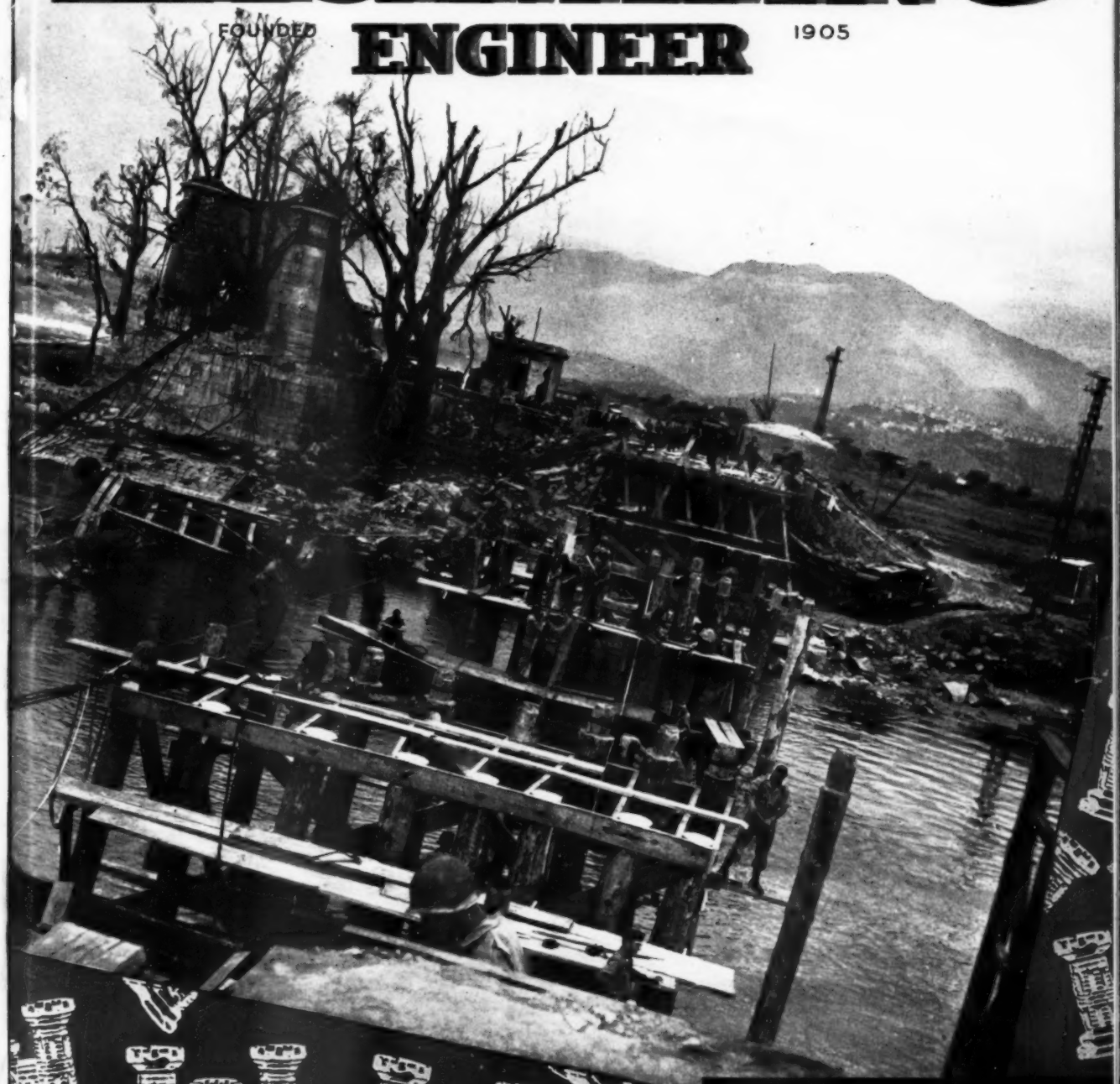
TRANSPORTATION LIBRARY

EXCAVATING ENGINEER

FOUNDED 1905



After 21 hours of work the fast-moving bridge builders of the U. S. Army Engineers have the piles driven into the river bottom and are ready to finish the job of spanning the water for the advance of the 5th Army in the Minturno area of Italy. The original bridge demolished by the Germans in their retreat shows at the left.

Signal Corps Photo

Vol. XXXVIII August 1948 Number 8

Which of these Wire Ropes Would You Use?

Years ago wire rope was not the highly specialized product it is today, nor was there as much use for wire rope or so many *different* uses.

Because of the many kinds of equipment using wire rope, plus the many and varied applications of that equipment, many sizes, grades, and constructions of wire rope must be made.

This makes it difficult for wire rope users to select the correct rope.

If the equipment is used in the normal way under average conditions, the manufacturer of the equipment can and does offer suggestions as to the type of rope they believe is best.

But should the equipment be altered to suit special needs, or should conditions not be average, a different wire rope specification is usually necessary for the best service.

Many Factors Considered

In recommending the correct wire rope for your equipment, several factors need to be considered:

1. Safety Factor—This has to do with the amount of loading and whether it is steady or a shock load.

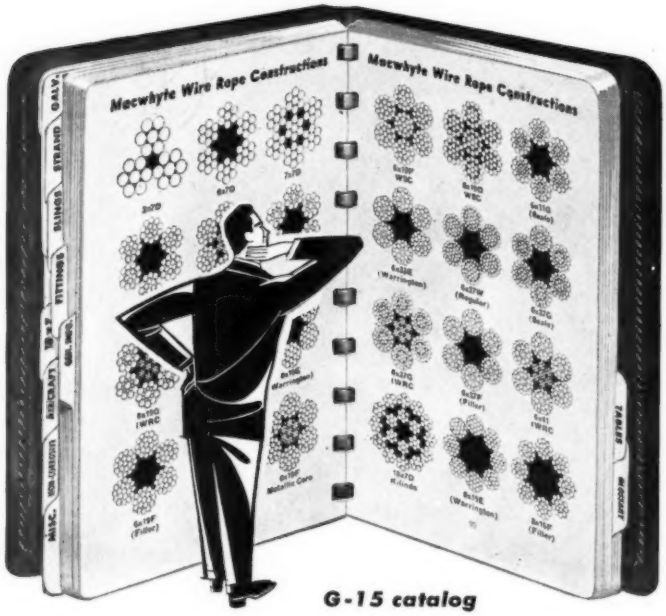
2. Bending Fatigue—This has to do with the number and size of sheaves, size of drum, and also speed of rope.

3. Abrasion.

4. Type of Equipment.

5. Use of Equipment.

Conditions of service on a given type of equipment vary so much that it is often helpful to know the type of rope previously used and the service it gave.



G-15 catalog

Then after a study of this information, wire rope can be recommended that experience proves will give the best service.

Sounds difficult, doesn't it? Really it isn't difficult when you have the advice and counsel of Macwhyte Wire Rope Engineers. Just write to Macwhyte Company, its distributors or mill depots. Tell them the make and model number of your equipment, explain briefly what it is being used for, and mention the size, grade, and construction of the rope you are now using.

Remember — Macwhyte makes the "Correct Wire Rope For Your Equipment."

Pictured above are but a few of the types of wire rope made by Macwhyte so that you may have the "Correct Rope For Your Equipment." There is a size, grade, and construction of Macwhyte Wire Rope that will give you low cost, safe service.

MACWHYTE PREformed WIRE ROPE

Plus Internal Lubrication Selected Steels Tested-Proved

The correct rope for your equipment

NO. 707

MACWHYTE COMPANY

ARMY E NAVY

Wire Rope Manufacturers

2903 FOURTEENTH AVENUE KENOSHA, WISCONSIN

Mill Depots: New York • Pittsburgh • Chicago • Fort Worth • Portland • Seattle • San Francisco. Distributors throughout the U.S.A.

MACWHYTE PREformed and Internally Lubricated Wire Rope
MONARCH WHYTE STRAND Wire Rope
MACWHYTE Special Traction Elevator Rope
MACWHYTE Braided Wire Rope Slings
MACWHYTE Aircraft Cables and Tie-Rods
MACWHYTE Stainless Steel Wire Rope
MACWHYTE Monel Metal Wire Rope

BE SURE YOUR NEXT PORTABLE COMPRESSOR

has all of these features

1. **Multi-speed regulator which automatically adjusts the engine speed to the use of air and practically eliminates wasteful idling... reduces average working speed of compressor and engine, resulting in more efficient operation and longer life ...and with pressure characteristics that will get more work out of air tools. (On MOBIL-AIR compressors, this regulator is called the "Drill-More" regulator.)**

2. **Convertible engine... quickly changed from operation on one fuel to another (gasoline, oil, or natural gas) by substitution of external fuel accessories only.**

3. **If a gasoline engine, the most economical type... which will make substantial savings even with regular gasoline and at all loads.**
   Or if an oil engine, a low-compression type that is easily started and easily maintained.

4. **A modern two-stage air-cooled compressor with Channel Valves.**

5. **Unified assembly of compressor and engine ...maintaining permanent alignment.**

6. **Light weight...but strong, sturdy, and tough.**

7. **Reasonable over-all dimensions.**

8. **Sturdy, easily operated and easily maintained clutch.**

9. **Electric cranking (for oil as well as gasoline engine) with commercial 6- or 12-volt equipment.**

10. **All operating controls and gauges centrally located.**

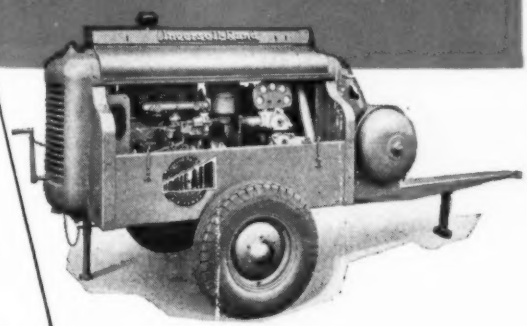
11. **Stream-lined design... for strength and durability.**

12. **Low, easily filled fuel tank.**

13. **Spring mounting and automotive steering if 210 cfm size or larger, 2-wheel trailer for all smaller sizes.**

14. **A fine, durable finish.**

15. **Proven design and performance.**



These features are built into MOBIL-AIR compressors... 5 sizes 105 to 500 cfm. These are the portables that decreased gasoline consumption as much as 40% compared to best previous models...and that established new records of endurance, reliability and low maintenance. Insist that your next portable is a MOBIL-AIR.

Ingersoll-Rand MOBIL-AIR AIR POWER

Ingersoll-Rand
11 BROADWAY, NEW YORK 4, N. Y.

2-435

COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • OIL AND GAS ENGINES

Big Jobs move faster with O-P-E-N C-E-N-T-E-R traction

Caterpillar Diesel DW-10 tractor with Goodyear Sure-Grip tires pulling LaPlant-Choate CW-10 scraper on Goodyear All-Weather Earth-Movers, moving heavy clay on airport job.

THE trend in earth moving is to bigger yardages — faster speeds — longer hauls. That calls for tires that won't gum up and spin under peak loads — tires with a sharp, clean grip that keep pulling.

Look at the O-P-E-N C-E-N-T-E-R *self-cleaning* tread of the Goodyear Sure-Grip pictured here, and you'll see why it is the greatest traction tread ever built.

It has no dead-end tread pockets, no mud traps to pack up solid. Dirt and stones sluice out, keeping the massive lugs sharp and keen for deep biting.

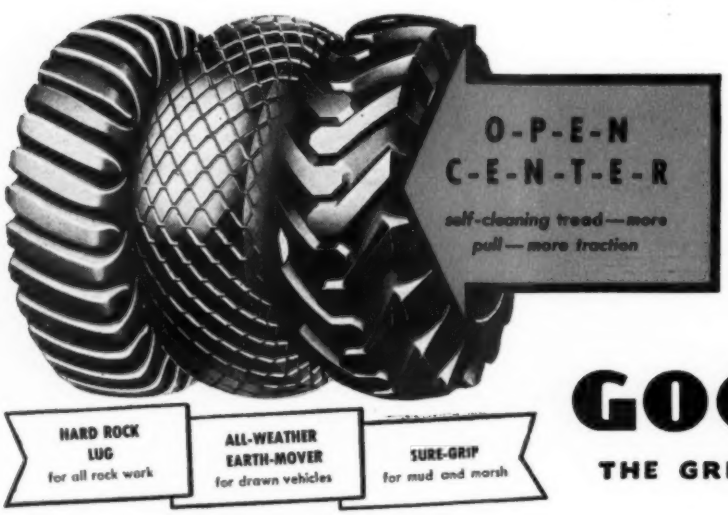
That's why you'll have less slip and spin with Goodyear Sure-Grips. They don't waste power; they keep you moving—on schedule.

This, combined with Goodyear's exclusive multiple-compounded construction and the extra strength of Goodyear's low stretch Supertwist cord carcass, gives you the sturdiest, toughest, most efficient tire ever built for big power units.

You can easily check on that. Just ask any contractor who has changed to Sure-Grips. He'll tell you Goodyears pull more, go faster and last longer. Why not see for yourself.

Sure-Grip, All-Weather, Supertwist—T.M.'s The Goodyear Tire & Rubber Company

THE RIGHT TIRE FOR EVERY JOB



BUY WAR BONDS—BUY FOR KEEPS

GOODYEAR

THE GREATEST NAME IN RUBBER

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

EXCAVATING ENGINEER

FOUNDED 1905

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Total excavation amounted to 1,630,000 cubic yards in the construction of this $30,000,000 project built on banks of the Pit River in Shasta County, California.

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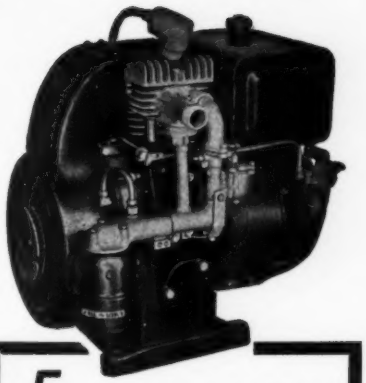


ELECTRICITY
For Any Job—Anywhere

For a dependable source of electricity on projects remote from commercial power, Onan Electric Plants are proven leaders in the field. More than half of the armed Forces' total requirements for Power Plants are built by Onan.

Gasoline-driven . . . Single-unit, compact design . . . Sturdy construction . . . Suitable for mobile, stationary or emergency service.

Over 65 models, ranging in sizes from 350 to 35,000 watts. 50 to 800 cycles, 115 to 660 volts, A.C.—6 to 4000 volts, D.C.—Also dual A.C.-D.C. output types.

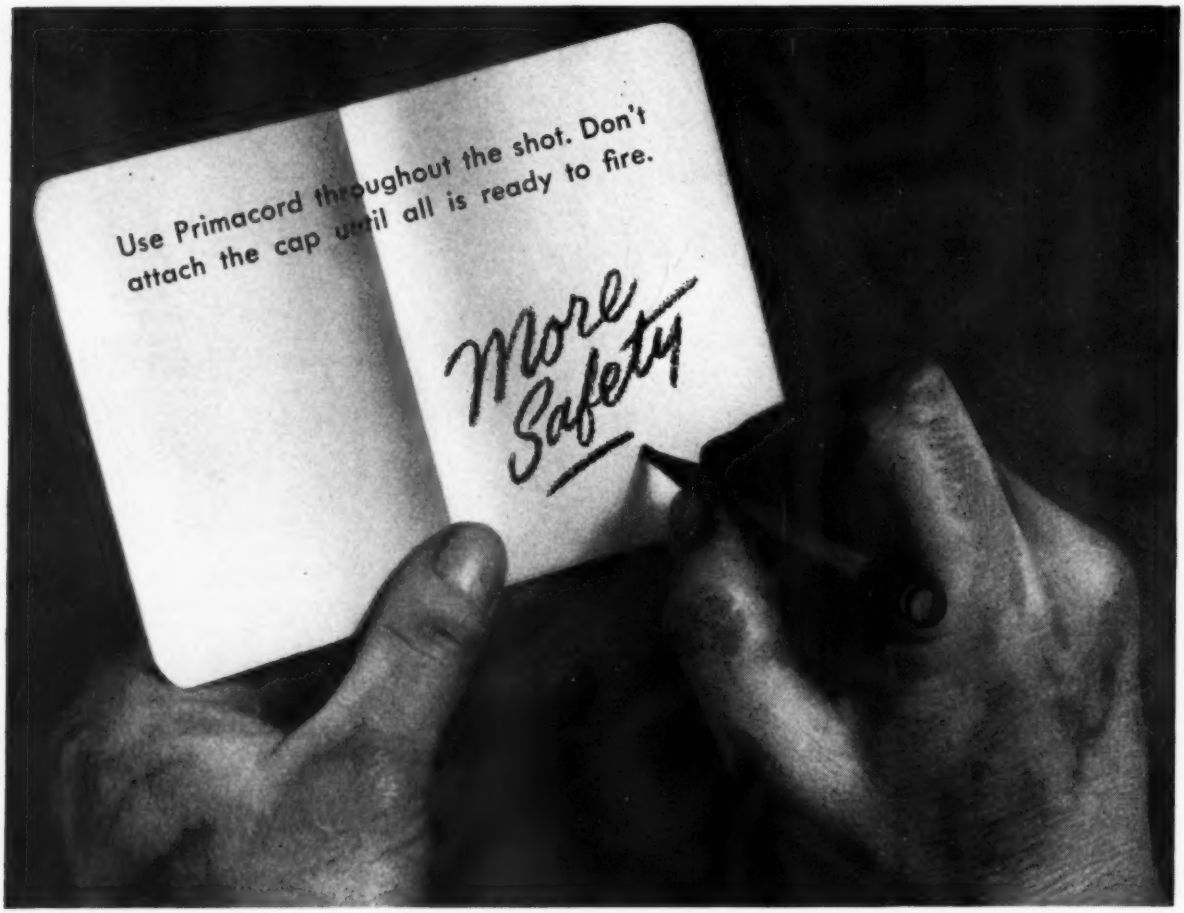
Descriptive literature sent promptly on request. D. W. ONAN & SONS, 3280 Royalston Ave., Minneapolis 5, Minn.

ONAN
ELECTRIC PLANTS

TOMORROW
May Be
TOO LATE

Save a Life

Make an Appointment Now with Your Local
RED CROSS
BLOOD DONOR SERVICE



When all is ready to fire . . .

ATTACH THE CAP

Yes . . . the use of Primacord promotes safety in loading and firing because the only cap on the job is applied to the end of the Primacord Trunk line *after* all holes have been loaded and connected. Primacord itself is insensitive to fire, friction or ordinary shock, and is not affected by stray electric currents from high voltage lines or thunder storms.

Primacord consists of a powerful core of PETN within a waterproof textile cover. It is simple and easy to use. When detonated with a single blasting cap, the powerful detonating wave travels at the rate of 3.9 miles per second and detonates *every* cartridge in *every* hole. Send for the Primacord Book.

PRIMACORD-BICKFORD

Detonating Fuse

Manufacturers of Safety Fuse since 1836

THE ENSIGN-BICKFORD COMPANY • SIMSBURY, CONNECTICUT

Still PUSHIN'

SIGNAL CORPS PHOTO

They're going big over there as they did over here! The same 2-cycle Diesel tractors that helped rush through the huge home front construction program the last few years are showing they still have plenty of service left . . . are now handling and licking even more difficult work for the Armed Forces overseas.

After tough day and night shifts on the big ordnance jobs here, they were put in tip-top operating condition in a hurry and shipped to distant areas of activity. Much of the overhauling was handled by Allis-Chalmers dealers whose skill, proper tools and genuine parts made A-1 repairs a certainty.

Now is the time to plan your future dirt-moving methods. Now is the time to investigate 2-cycle Diesel power . . . see what it will do for you! Why not talk it over with your Allis-Chalmers dealer! - Write for literature.

↓ During the days of action here, 2-cycle Diesel tractors in great numbers helped lay the groundwork for the Arsenal of Democracy.

↑ Now in active theaters of the war, the same 2-cycle Diesel tractors help prepare the bases and airfields for use against the enemy.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

2-CYCLE THE MODERN DIESEL POWER

Locomotive "No. 1," which puffed its way across the dales of mid-Wisconsin in 1851, was one of the trail blazers for the present magnificent transcontinental system of the Milwaukee Road.

Movement of vital war freight was speeded and tonnage increased when the Milwaukee Railroad installed General Motors Diesel Locomotives on the 225-mile mountain zone between Avery, Idaho, and Othello, Washington.

PATTERN FOR FINER TRANSPORTATION

WRITTEN into the grueling war job the railroads of America are doing, is the story of this mighty titan of the rails. This is the General Motors Diesel Locomotive. It is displaying the unusual stamina, speed and willingness to work ceaselessly which these urgent times demand. And with such tireless, low-cost, swift service these GM Diesel Locomotives are providing a pattern for finer transportation in the greater days to come.

★
KEEP
AMERICA
STRONG
BUY MORE
WAR BONDS
★

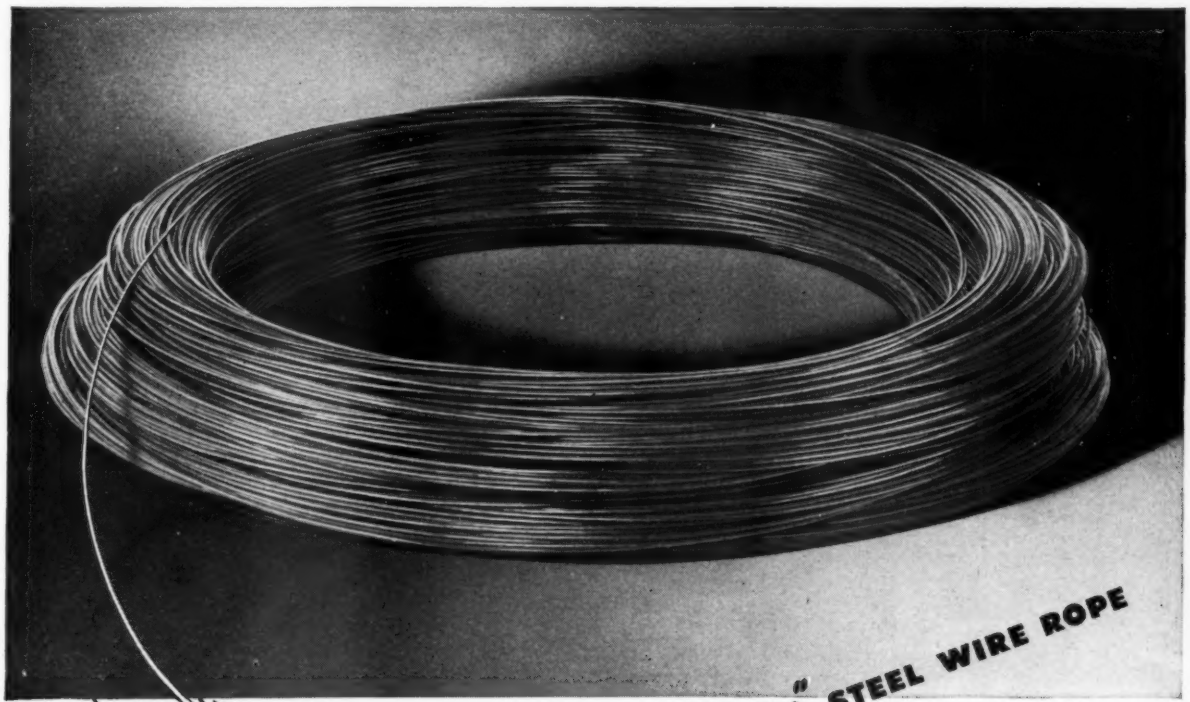
GM
GENERAL MOTORS
DIESEL
POWER

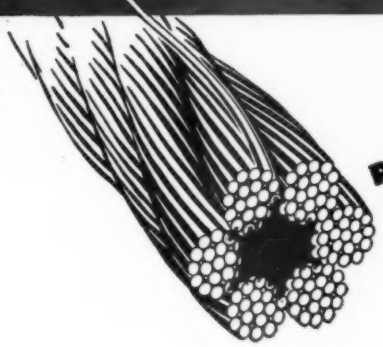
LOCOMOTIVES . . . . . ***ELECTRO-MOTIVE DIVISION,*** *La Grange, Ill.*

ENGINES . . *150 to 2000 H.P.* . . *CLEVELAND DIESEL ENGINE DIVISION, Cleveland 11, Ohio*

ENGINES . . . *15 to 250 H.P.* . . . . . *DETROIT DIESEL ENGINE DIVISION, Detroit 23, Mich.*

Wire rope can be no better than the individual wires that go into its construction . . . our open hearths, blooming mills, rod and wire mills are all dedicated to the production of specialized wire and wire alone





WHAT CAN YOU EXPECT from Roebling? Rope that has known capacity to deliver service. Engineering, in our plant and at your job, to put the rope to work right. Maintenance practices that protect its long life. » » Your postwar profits and postwar jobs will depend in part on operating rope-rigged equipment at lowest cost. You can leave that part to Roebling.

JOHN A. ROEBLING'S SONS COMPANY, Trenton 2, New Jersey
Branches and Warehouses in Principal Cities

ROEBLING

PACEMAKER IN WIRE PRODUCTS

WIRE ROPE AND STRAND • FITTINGS • AERIAL WIRE ROPE SYSTEMS • COLD ROLLED STRIP • HIGH AND LOW CARBON ACID AND BASIC OPEN HEARTH STEELS • ROUND AND SHAPED WIRE • ELECTRICAL WIRES AND CABLES • WIRE CLOTH AND NETTING AIRCORD, SWAGED TERMINALS AND ASSEMBLIES • SUSPENSION BRIDGES AND CABLES

PROVED IN

The men and women of our armed forces have proved that they have the courage, resourcefulness, stamina to carry the war to a Victorious conclusion. American equipment, too, like the 240-mm howitzer illustrated here, and now in action on the Italian front, is constantly proving its superiority.

Experience and reputation in designing and building outstanding large excavating equipment led to the selection of Bucyrus-Erie to work with the Army on the design and manufacture of the new 240-mm howitzer. We're proud of that selection and of the phenomenal accuracy this weapon is demonstrating in battle. The same factors that make this largest U. S. mobile gun a leader, make your Bucyrus-Erie excavators "years ahead."

That's why Bucyrus-Erie stripping shovels, in action on the coal-producing front, have thoroughly proved what has long been said about them — that they have the speed, stamina, workmanship to deliver the output demanded by the huge coal requirements of war. That's why leading operators include Bucyrus-Eries in their equipment.

V-54C

O.W.I. Photo

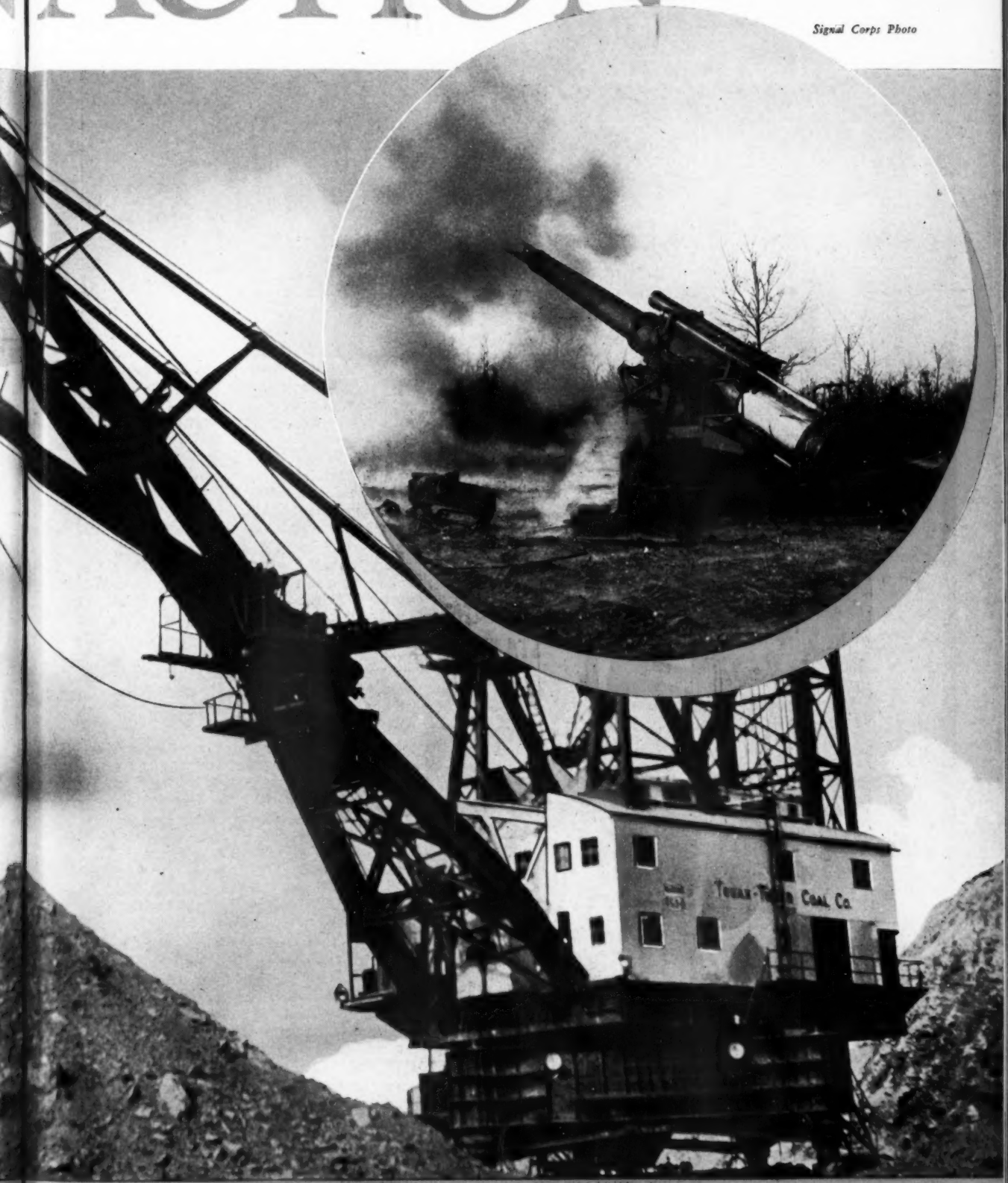
BUCYRUS ERIE

"YEARS AHEAD" EXCAVATORS

SOUTH MILWAUKEE, WISCONSIN

ACTION

Signal Corps Photo



ORS FOR THE YEARS AHEAD

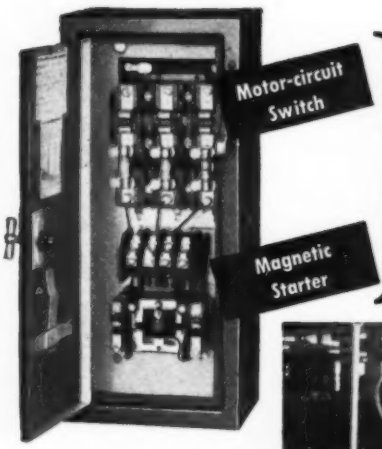
ONE COMPACT UNIT

FOR MOTOR CONTROL AND PROTECTION

You can save time and space ...gain greater protection, too

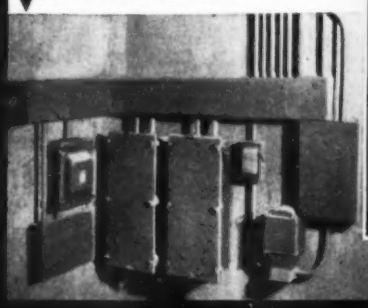
WHY TWO DEVICES?

ONE CAN DO THE JOB



COMBINATION STARTER

These starters in dust-tight enclosures provide reliable operation.



Combination starter installed on a special machine for assembling ribbon cores to transformer coils.

YOU no longer need buy a separate device for each function of motor control. Now you can get *combination* control—in a *variety of enclosures* to meet every operating condition. This control combines a motor-circuit switch and a magnetic starter in one, compact, easy-to-mount unit.

1. Reduced Installation Time—Users of these starters report a 50 per-cent reduction in mounting time and a 40 per-cent reduction in wiring time.

2. Motor Protection—With G-E combination starters, you're sure that the rating of the motor-circuit switch matches that of the magnetic starter with which it is to be used.

3. Greater Safety—The motor-circuit switch, or breaker, being in the same case with the magnetic starter, is mechanically interlocked with the cover. Thus, the cover cannot be opened while there is power on the starter.

4. Less Space Required—Combination starters take up less mounting space than separately mounted safety switches and starters.

5. Quick Selection—By ordering *one* factory co-ordinated unit instead of two, you can save time. You specify the motor rating, the type of motor-circuit switch you want, and the application you have in mind—we'll send the starter you need.

Need More Information? These starters are also available for high-voltage motors. For further information on G-E combination starters write to our local office for Bulletin GEA-3715. *General Electric Co., Schenectady 5, N. Y.*

BUY WAR BONDS

GENERAL ELECTRIC

"OUR TRUCKS DO TWICE AS MUCH WORK SINCE WE SWITCHED TO TRAILERS"

—J. A. MERCIER BRICK CO.

THIS EXPERIENCED USER EXPLAINS HOW FRUEHAUF TRAILERS CUT DELIVERY COSTS

"Before we switched to Trailers for delivering brick and concrete blocks, our trucks were often tied up in the yards for loading until 10:00 or 11:00 o'clock in the morning.

"Actually, about half of each truck-and-driver's working hours were eaten up in loading time . . . because the trucks had to stand idle . . . and the best we could get was 2 to 3 round-trips a day with each truck.

"Here are the advantages we have found with the Trailers:

- "Our trucks now do twice as much work as they did before. They average 5 round-trips a day on deliveries up to 25 miles away . . . often make as many as 6 deliveries daily. That's because each truck leaves early in the morning with a Trailer that has been loaded the previous afternoon. While the truck is gone, another Trailer is being loaded. As soon as the truck returns, it "drops" the empty Trailer, couples up to a loaded one and starts off on another delivery.
- "Besides making more trips, the Trailers carry bigger loads. The trucks carried 3,000 bricks or 300 8-inch blocks . . . The Trailers haul 6,000 bricks or 600 blocks . . . yet these double loads are pulled by the same trucks as before. All we did was take the platform off the trucks and shorten the wheelbase.
- "Here's another point. Most of our deliveries are off the road, and we find that the shorter wheelbase truck pulling a Trailer gets through muddy stretches where trucks alone wouldn't budge.

"Everybody is pleased with the Trailers — our customers get better service — our drivers make more money since they are paid for the trips they make — and we're saving money by making more deliveries with only half as many trucks. As a matter of fact, the Trailers have worked out so well for us that we are planning to convert the remaining trucks in our fleet into truck-tractors, and switch our entire operation to Trailers, as soon as the war is over."

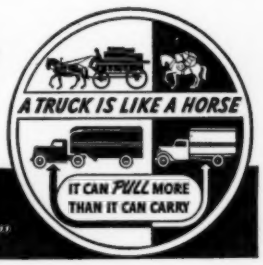
Whether you operate one or two trucks or a large fleet, it's likely that Trailers will fit into your operation, too, and save money for you. Why not call in a Fruehauf transportation engineer today and let him go over your delivery set-up with you? There is no cost or obligation for this service and it may mean a big saving.

World's Largest Builders of Truck-Trailers

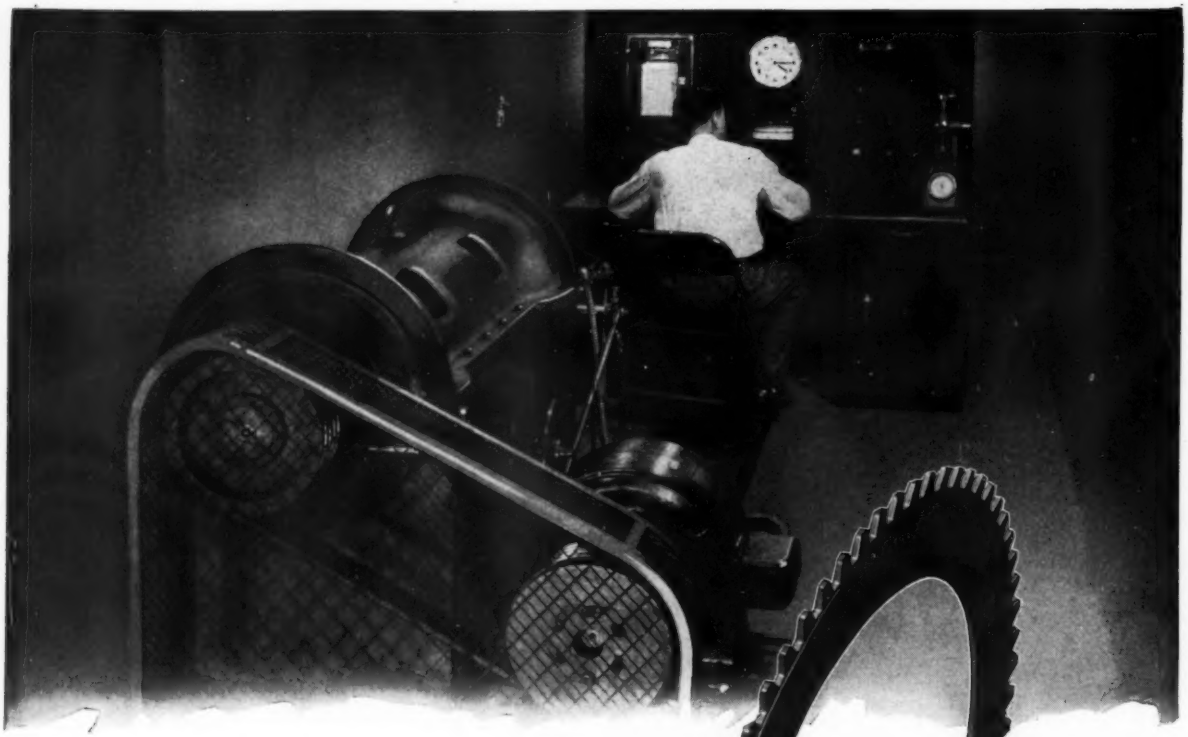
FRUEHAUF TRAILER COMPANY

DETROIT

Service in Principal Cities



FRUEHAUF TRAILERS "ENGINEERED TRANSPORTATION" Reg. U. S. Pat. Off.



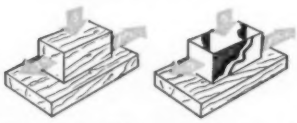
...to give you BETTER friction materials

The large and well equipped Wellman laboratories are devoted exclusively to testing *rubbing surfaces.* With many different types of dynamometers and much other specialized equipment, our skilled engineers are engaged in continuous study of powdered metal friction materials. The result: Velvetouch clutch facings and brake linings give you the utmost in dependable performance and long wear. Specify Velvetouch for replacements in your tractors, scrapers, shovels and other earth-moving equipment.

THE S. K. WELLMAN COMPANY
1374 East 51st Street • Cleveland 3, Ohio

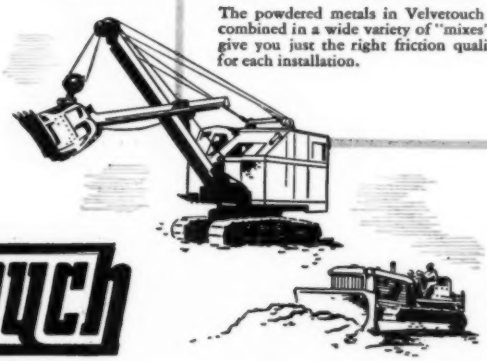
Interesting facts about Friction

Whenever a pair of surfaces rub together, friction is developed which tends to retard the motion. Friction between like bodies is greater than between unlike bodies, hence the reason for steel shafts housed in bronze journals.



Hard wood rubbing against hard wood under certain conditions would have a coefficient of slightly less than .5. On the other hand, lubricated wrought iron on hard wood under the same conditions would have a coefficient of less than .1.

The powdered metals in Velvetouch are combined in a wide variety of "mixes" to give you just the right friction qualities for each installation.



FOR BRAKE AND CLUTCH USE **Velvetouch**

HOW TO SOLVE OPERATING PROBLEMS WITH *Correct Lubrication*

Give your Groundbreaker a Break!

WITH GARGOYLE ALMO OIL NO. 3

•

OXIDATION that causes valves to gum up...water that washes oil films off... corrosion and rust that increase repair and replacement expense....

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This specially refined oil provides high chemical stability to resist oxidation and gumming. It sticks on vital parts, despite the washing action of water, and gives them full protection against corrosion and rust.

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GARGOYLE Lubricants

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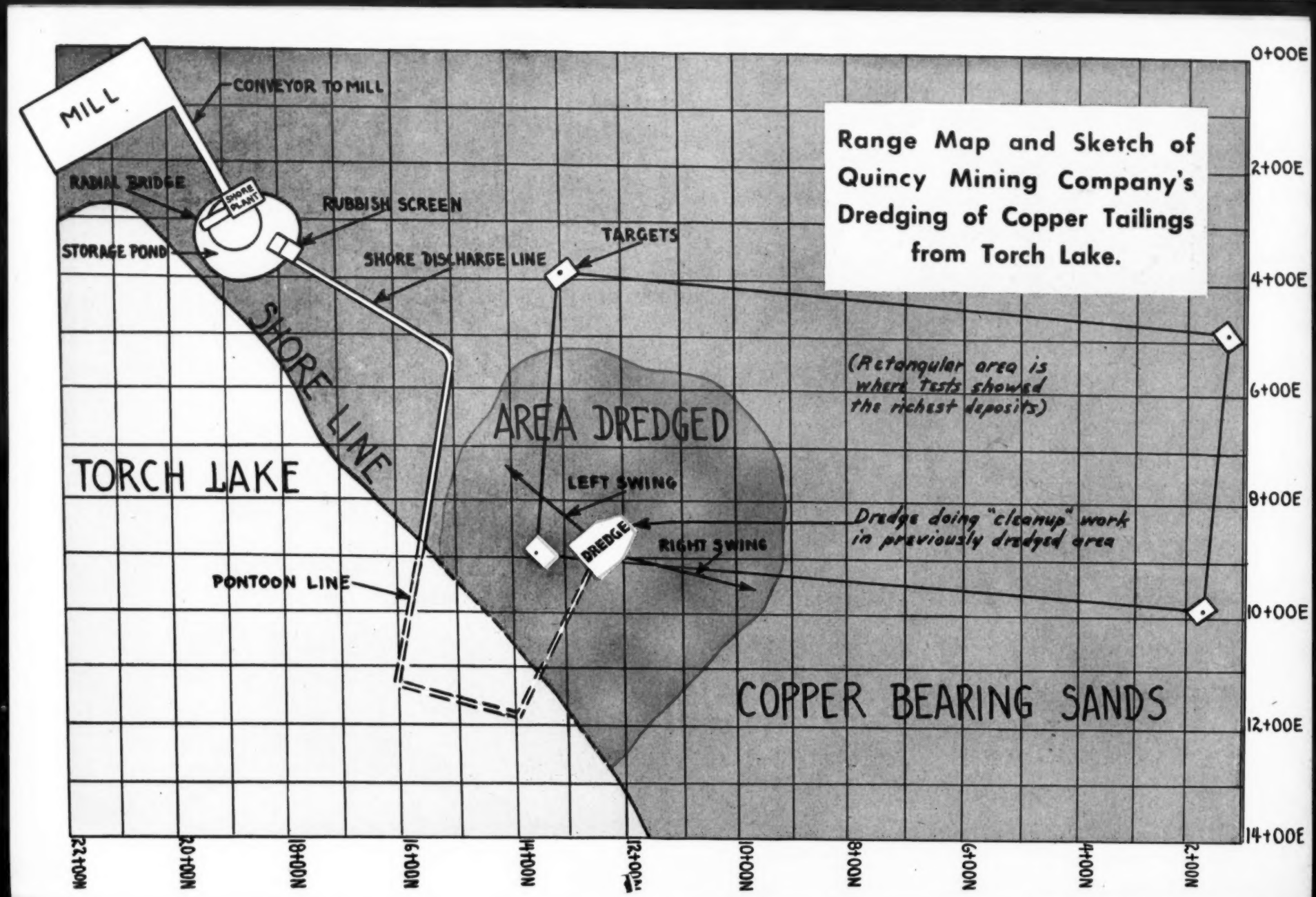
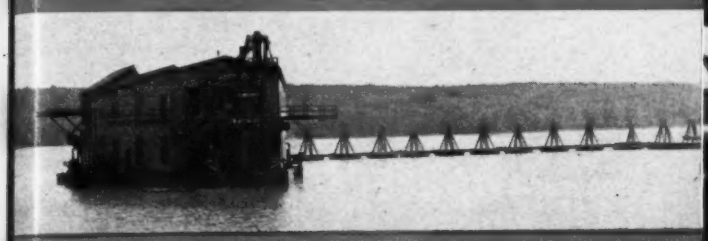
ONE OF A SERIES OF SUGGESTIONS TO AID PRODUCTION


Range Map and Sketch of Quincy Mining Company's Dredging of Copper Tailings from Torch Lake.
MILL
CONVEYOR TO MILL
RADIAL BRIDGE
SHORE PLANT
RUBBISH SCREEN
STORAGE POND
SHORE DISCHARGE LINE
TARGETS
SHORE LINE
TORCH LAKE
AREA DREDGED
(Retangular area is where tests showed the richest deposits)
LEFT SWING
DREDGE
RIGHT SWING
Dredge doing "cleanup" work in previously dredged area
PONTOON LINE
COPPER BEARING SANDS
0+00E
2+00E
4+00E
6+00E
8+00E
10+00E
12+00E
14+00E
22+00N
20+00N
18+00N
16+00N
14+00N
12+00N
10+00N
8+00N
6+00N
4+00N
2+00N

THE DREDGE QUINCY



This 20-inch hydraulic dredge works 12 months a year pumping copper sand tailings from Torch Lake for reclassifying by the Quincy Mining Company.

● **Front view (above) of the "Quincy" pumping into the bank and (left) the dredge, with a portion of the pontoon line shown, is cleaning up in an area previously dredged.**

THE WAR HAS BROUGHT about many changes. In every section of the country people are accepting modes of living and experiencing methods of doing things that they previously considered impossible, or at least too incongruous to be practical.

Residents of middle-western prairie states would never have believed that the day would arrive when ocean-going ships would be built right in their backyards. Citizens of many a quiet and orderly farm community would have told you that you were crazy if you had predicted that their staid village would someday become a humming industrial community turning out guns and ammunition. So it was before the war in the Upper Michigan peninsula. Dredges were not uncommon in this area called the "Copper Country," but none of the people of this area, or the dredgemen themselves for that matter, would have predicted that the day would arrive when a dredge would operate 12 months a year, right through the extremely cold and blustery winter months when the long stretches of winter days and nights with the temperature hovering around 20° below zero freezes Lake Superior and the Keweenaw Waterway so solid that shipping becomes impossible until the Spring thaw arrives. It was just taken for granted that dredges did not operate after the freeze came.

But war has also changed the picture in the Copper Country. The operation of a dredge through the winter months is now an actuality. The dredge "Quincy" was put into operation last September 1 and taken over by the Quincy Mining Co. personnel on November 1 and has been working continuously since that time recovering copper sand tailings from Torch Lake at Mason, Michigan.

Torch Lake is a tributary lake of Lake Superior and it has been for many years the site of several stamp mills. In addition to the Quincy Mill at Mason from which tailings have been deposited in over 50 years of operation, there are the stamp mills of the Calumet & Hecla Consolidated Copper Co. at Lake Linden, a city at the northwest end of Torch Lake, and the old Tamarack mill at Hubbell. The shores of Torch Lake slope gently to the water's edge and the lake itself is very deep for its area. The compact body of copper sand that results from the contour of the lake and the slight elevation of the plants along the lake shore make it an ideal site for dredging.

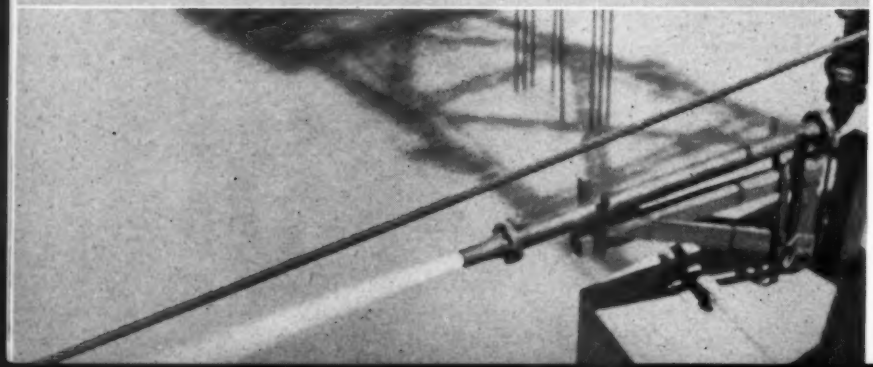
Two Types of Tailings

The copper sand tailings of this district are of two types, the conglomerate (red) sands and the lower grade amygdaloid (blue) sands. The red sands, but not the blue sands, can be leached. Calumet & Hecla has been operating two dredges and retreatment plants for reclaiming the deposits of the richer red sands for a number of years. Almost 500,000,000 pounds of copper have been reclaimed from these conglomerate sands in Torch Lake since 1915. The success of the Calumet & Hecla operations naturally attracted attention to the possibility of the economic development of reclaiming the lower grade blue sand deposits from Torch Lake.

The Quincy Mining Co. long recognized the commercial possibility of reclaiming the Quincy blue sands deposit, but at the prevailing price of copper in recent years it was considered a marginal venture at best. It

● Above: Closeup of mouth of suction pipe with special suction head water chamber casting fitted with nozzles for high pressure water jets to loosen material being dredged. Water is delivered through these jets by either one or two 10-inch jetting pumps capable of delivering 2,500 gallons per minute against a total head of 175 feet. Left: Suction head jetting water with ladder in raised position. Below: Side view of the head.

● Below: One of four deck jets used to deliver high-pressure water for breaking up ice on the dredge pond during winter operation. These jets are located in the bow and stern on the starboard and port sides. Each pump can be operated independently.



was estimated that 12c copper would give an operating profit but would not be adequate to pay an annual interest as profit and also return the original investment. The war-born need for copper, however, changed the picture. The need for more copper became desperate, capital could be obtained from the Metals Reserve Co. and a premium for copper, in excess of 12c was available. As a result an application for funds was made and was approved by the War Production Board and by the Metals Reserve Co. Because of its experience in the proposed type of operation, Calumet & Hecla was chosen by Quincy and Metals Reserve to design the plant and to act as trustee for the two companies so far as the design work and letting contracts were concerned, and also to put the plant into successful operation. The plant was built for $1,150,000, the original amount requested, and later $50,000 was added for operating capital.

Survey Area to be Dredged

When the Quincy mill began operation on Torch Lake over 50 years ago the ore treated from mining near the surface was richer than in later years when it became necessary to mine to greater depths. In the earlier days the metallurgical processes were also more crude and so the tailings were richer in copper. Thus, in general the tailing bank shows progressive decrease in copper content from the old near-shore deposits outward in all directions to the circumference of the pile. The Quincy Milling Co. recognized that it would not be profitable to dredge the entire bank and so the most favorable area was chosen for the retreatment operation. This area was surveyed and staked out by Quincy officials and carefully sampled by the metallurgical department of the Michigan College of Mines at nearby Houghton.

A rectangular area of the sand deposit 1,200 feet long and 450 feet wide was surveyed and divided into 12 smaller rectangles, each 300 feet long and 150 feet wide. A sampling hole was churn-drilled in the center of each of the 12 smaller rectangles and the contents of each hole sampled every six feet of depth. An average value of the copper contents of the sands was thus calculated and applied to the tonnage involved in the area surveyed, allowing for sloping banks.

The material ultimately to be dredged is not confined to the rectangular area tested, but it is expected that the deposits in the surveyed area will yield the capital expenditure at

a return to Metals Reserve of 4c per pound of copper.

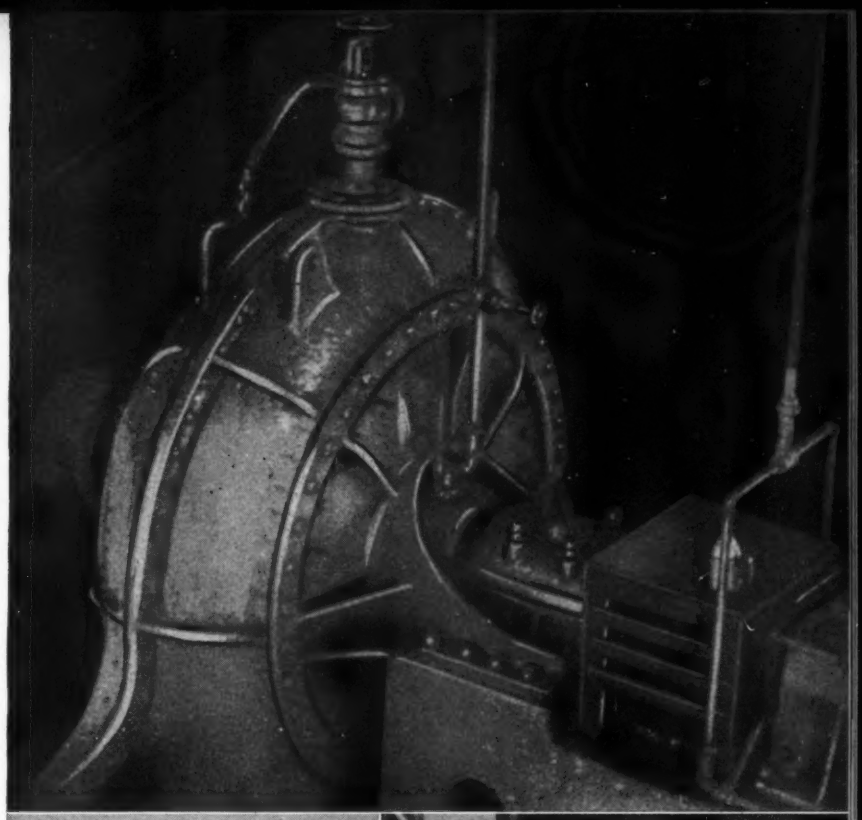
The dredge used for the work was designed and built by Bucyrus-Erie Company. The "Quincy" is a 20-inch hydraulic dredge with an electrically driven suction dredging unit receiving its power through a flexible cable run over the pontoon line from a three-phase, 25 cycle, 2,300 volt shore supply from the Calumet & Hecla power house at Lake Linden, about four miles distance from Mason. The dredge hull, deck and pilot house, all constructed of wood, were built by R. C. Buck, Inc., Superior, Wis. The structural steel bow gantry for supporting the ladder suspension tackle, the longitudinal hull trusses and the crane runways with supporting columns were all furnished by Bucyrus-Erie Co.

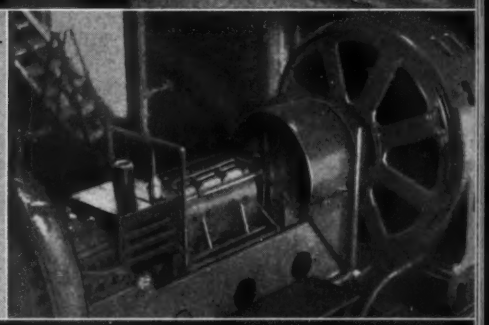
Water Jet Suction Head

Instead of having a cutter head the "Quincy" excavates by means of high pressure water jets at the mouth of the suction pipe. The lower end of the suction pipe on the ladder terminates in a special suction head casting having a water chamber fitted with nozzles for the high pressure jets to loosen the material being dredged. The water is delivered through these high pressure jets by either one of two 10-inch motor-driven jetting pumps, each capable of delivering 2,500 gallons of water per minute against a total head of 175 feet. The two pumps are duplicates and are piped so that either pump may be used, the second pump always being available as a spare. Piping is also arranged so that either pump may be used to deliver high-pressure water through four deck jets for breaking up ice on the dredge pond during cold weather operation —the feature that enables this dredge to continue pumping throughout the winter months.

The pumped material is handled by an Allis-Chalmers single-action, centrifugal-type 20-inch dredging pump which is driven by a 1,000 h.p. induction motor running at 300 r.p.m. The outboard suction line is supported on a structural steel ladder of the latticed girder type, approximately 95 feet long. The dredge is capable of cutting its own flotation and will pump to a depth of 70 feet below water level with the upper end of the suction ladder inclined at an angle of 45°.

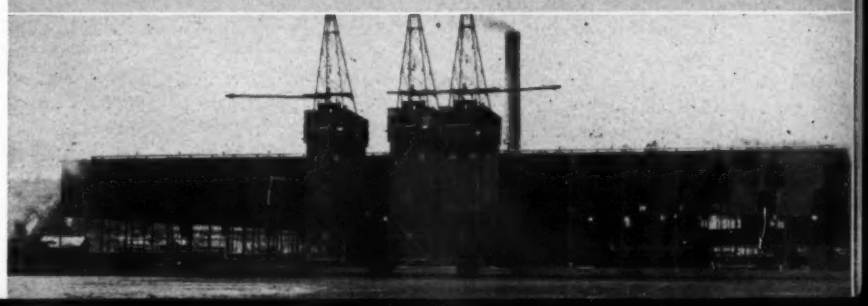
Heavy, steel-casting brackets on the hull support the ladder and permit it to travel in the vertical direction. The bracket castings are provided with pressure gun fittings for grease lubrication of the ladder trunnion. The





● Above: Allis-Chalmers single-action centrifugal 20" main dredging pump of the "Quincy." It is driven by the 1,000 h.p. induction motor running at 300 r.p.m. shown at the right.

● Above: Innerliner of main pump worn beyond repair after 1,814 hours of service. The innerliner is built up every two or three weeks by welding with Stoody high carbon rod. Below: Coal-loading dock on Torch Lake about half-mile from the dredging operation where supplies for dredge are brought either by rail or water.



● Brace and clamp holding "tail line" of main pump discharge to stern of dredge keeps pipe from pulling out of rubber sleeve connection.

● A section of the pontoon line. Power transmission lines are carried over the pontoon superstructure. Note in the upper right where power lines can be disconnected when pontoon line is shortened or lengthened. Work tug is moored to pontoon.

● Pontoon line pipe i
30"-long 18-ply Goo
tached to the pipes
cable is run between t

large size trunnion bearings require greasing at least once each eight-hour shift.

The outboard suction line is connected to the main pump by means of a swivel elbow and a rubber suction hose. The inboard discharge pipe is connected to the main pump by a 36-inch long rubber sleeve and contains a water-flushed 20-inch swing type check valve near the stern of the dredge.

The angle of the structural steel suction ladder, and consequently the digging depth, is changed by the ladder hoist machinery which is built as an extension of the port winches. The lower part of the ladder is suspended by a single one-inch wire rope, reeved eight-part between the upper block, supported by the structural steel gantry, and the lower block, attached to the ladder by shackles.

The latter suspension sheaves run on grease-lubricated plain bearings and the sheaves in the block below water have bronze bushings. Each pin is drilled and tapped for individual lubrication of each sheave. These grease fittings are all serviced each eight-hour shift with a water-resistant, lime-base grease. The ladder hoist cable and the swing lines are kept well coated with a wire rope lubricant to prevent deterioration from internal friction and weather.

Wire rope side guys with adjusting turnbuckles are anchored to equalizers pivoted on connecting brackets on the deck. The grease fittings on these equalizers are also serviced each eight-hour shift when the ladder trunnions are lubricated.

Swing Lines

The "Quincy" is maneuvered by one-inch swing lines of wire rope reeved from the swing line drums of the port and starboard winches through fairlead sheaves. There are two stern swing lines, a stern line, two bow swing lines and two ladder swing lines. The starboard and port winches are similar in construction with a stern, bow and ladder swing drums, except that the starboard winch has a fourth drum for the stern line. The ladder hoist machinery, an entirely independent unit, is mounted as an extension of the port winch base. Roebling wire rope is used exclusively on the dredge.

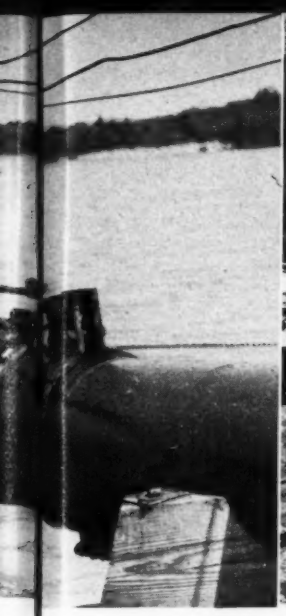
The drive for each winch consists of a 50 h.p. wound rotor induction motor started and stopped from the pilot house by a drum controller, also arranged to permit operation at reduced speeds up to 33⅓ reduction. The motors drive the drum shafts through the two open spur gear reductions. The intermediate shafts and the drum shafts are all run in babbitt-lined, two-piece bearings rigidly secured to the winch base members. The intermediate and drum shaft bearings are greased through a pressure gun fitting at least twice each eight-hour shift. The gear teeth of the drum shaft gears and the intermediate shaft gears are kept well-coated with a gear compound.

All the rope drums are similar in construction and are provided with bronze bushings running on the drum shafts. The seven outside-band drum clutches are also similar in construction and are adjusted in similar manner. Each clutch is operated by a spindle in the end of the drum shaft. The spindle is moved by an air-operated thrust cylinder mounted at the end of the shaft. Each thrust cylinder is controlled by an air valve in the pilot house of the "Quincy."

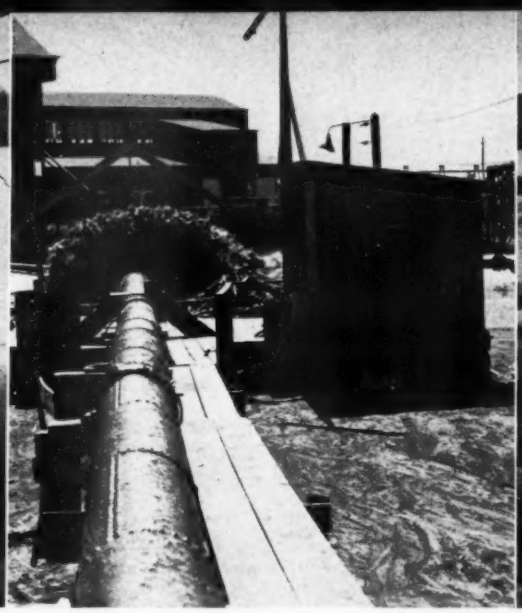
The brakes on all seven drums are the outside-band type lined with asbestos and are operated by hand levers in the pilot house of the dredge. The ladder hoist machinery consists of a drum gear driven—keyed to a shaft running in grease-lubricated babbitt-lined bearings, similar to the winch drum shaft bearings. The gear drum is driven through a single open spur gear reduction by a 52 h.p. motor controlled from the pilot house. There is no operating clutch. The ladder is lowered by reversing the motor which is arranged for regenerative braking. The brake sets whenever the ladder hoist motor controller is returned to neutral position.

Ladder Hoist Machinery

The ladder hoist drum is held from turning by a compound brake operated by an air cylinder controlled from the pilot house. There is also a manually-operated lever on the winch base which may be connected for emergency operation of the ladder hoist brake. This lever is ordinarily left disconnected. The compound



length is joined with rubber sleeves at- steel clamps. Safety clamps over the sleeve.



● Material dredged is discharged on a cast steel screen with one-inch holes. Semaphore on screenman's house to right is used to signal dredge operator when lake bottom clay is being pumped instead of the copper bearing sands.

● Upper: Radial bridge pivoted outside of shore plant on circumferential steel rail carrying suction pipe of 12" Morris centrifugal dredge pump which carries material from storage pond of dredge discharge to regrinding mill. Lower: Emergency valve on discharge line to prevent "choke-ups."

brake consists of two separate bands, lined with wood blocks, running on brake housing at either end of the ladder hoist drum. The dead end of the brake band next to the drum gear is connected by an adjusting turnbuckle to a lever on a cross shaft which operates the brakes on the opposite end of the drum. The live end of this band is connected to the short lever on the cross shaft by an adjusting turnbuckle. Compensation for the wear of the wood blocks is made by taking up on the adjusting turnbuckles.

A depth indicator in the pilot house gives the operator constant warning of the depth at which the suction head is being operated. Vacuum and pressure gauges, mounted on a gauge board on the rear wall of the pilot house in full view of the operator give continuous indication of the manner in which the pump is handling the dredged material. There is also a similar gauge board in the dredge house for the pumps.

Two Buda auxiliary gasoline engine driven winches are also located on the dredge. One is mounted just forward of the port winch and the other on the starboard side at the stern of the dredge. Other auxiliary equipment includes two five-inch motor-driven service-water pumps, a coal-burning boiler with necessary piping for heating the dredge by means of five Modine heaters suitably located about the dredge, and a six-ton overhead traveling crane operated from a direct-current motor-generator set.

Dredge Hull

The hull of the dredge is 100′ long, 55′ wide and 9′ deep and is made up of multiple watertight compartments. Tons of concrete were poured into the port stern compartments to balance the weight of the main pump and motor which is located in the starboard stern section of the dredge. Partially flooded compartments act as ballast and the dredge is kept at even keel by keeping water at various levels in the different compartments. There are eight-foot overhanging deck brackets on each side of the upper deck structure. The house is 75′6″ long and 55′ wide and 27′8″ high from the deck level to the eaves and about 35′ high to the peak of the roof. There are no living quarters on the "Quincy."

The hull of the dredge was constructed on one of the sloping tailing piles on the shores of Torch Lake and when completed it was launched by cutting its passage through about two-feet thick ice. Installation of dredge machinery started about April 1, 1943, and late in August the "Quincy" was ready for trial.

The "Quincy" operates six days a week on two eight-hour shifts, from 7 a.m. to 3 p.m. and from 3 p.m. to 11 p.m. Sometimes the dredge is worked two 12-hour shifts on Saturdays, depending on the amount of material available in the mill storage pond. The mill is operated seven days a week on three eight-hour shifts. The "Quincy" has a crew of 11 men under the supervision of E. J. Hauswirth, dredgemaster. There is a five-man crew on day operations and a four-man crew at night. The crew is made up of an operator, screenman, lineman and switchboard man on each shift. A general utility man works on the day shift. The other two men, to make up the 11-man crew, are a watchman and a "bump off" man who relieves the watchman on his "off" days and substitutes for other members of the crew who may be absent. All ordinary maintenance work is taken care of by men on the dredge. The company's electrician is on call for electrical maintenance and repairs and works with the help of members of the dredge's crew. The screenmen work four hours each shift at the screen house where the shore line discharges its material and four hours on the dredge. When one of the screenmen is working his four hours on the dredge, another member of the crew substitutes in the screen house. The screenman also has charge of the discharge pipe from the pontoon line to the discharge. The lineman, one each shift, is in charge of the pontoon line from the dredge to the shoreline. The switchboard man, or pumpman, watches the gauges controlling pump action and he and the operator are on the dredge at all times during their shift.

Pumping Operations

The dredge started pumping 1,400 feet out from the original shore line at the point that dredging operations were to be carried on. It dug itself in

● Electric power for operating the dredge machinery is brought in on lines strung along an overhead structure on the pontoons at 2,300 volts, d.c. The thinner wires over the lower cross beam are for welding, light and telephone.

toward shore to 800 feet from the original shore line where it started actual dredging operations on October 1, 1943. The Quincy Mining Company personnel took over the operation of the dredge on November 1 after Calumet & Hecla personnel completed various trial operations.

The "Quincy" pumps on ranges and operates off the stern line which is anchored on a mushroom anchor about 1,500 feet out in the lake as a pivot. The "Quincy" has a maximum efficient pumping radius of 350 feet, but can, in case of emergency, extend this radius to about 410 feet. The center well for the suction ladder and the tapered bow corners permits the dredge to pump close to the bank. The six swing lines, including the ladder swings, three on the starboard and three on the port side, are also each about 1,500 feet long.

The amount of copper sands in various parts of the deposit was estimated by old government soundings and the material dredged varies from a minimum of 20′ to a maximum of 69′. The dredge sweeps its way inward on a 350-foot radius on the stern line pivot, starting at one end of the swing and then working toward the other side of the semi-circle and then moving forward and repeating the operation, swinging back on the circumference. The pontoon line from the dredge to the first elbow in the pontoon line is called the "tail" line. In pumping operations the tail line is always kept at right angles with the cross lines, that is, with the port and starboard swing lines. After an area is dredging soundings are taken to determine the whereabouts and amount of copper sands left in various depressions in the lake bottom. The company is interested in getting all of the sands out of the area dredged and if soundings taken after an area has been dredged indicate from the old government soundings that pockets of sand are left in places, the dredge is taken back over these areas and this sand is removed in "cleanup" operations.

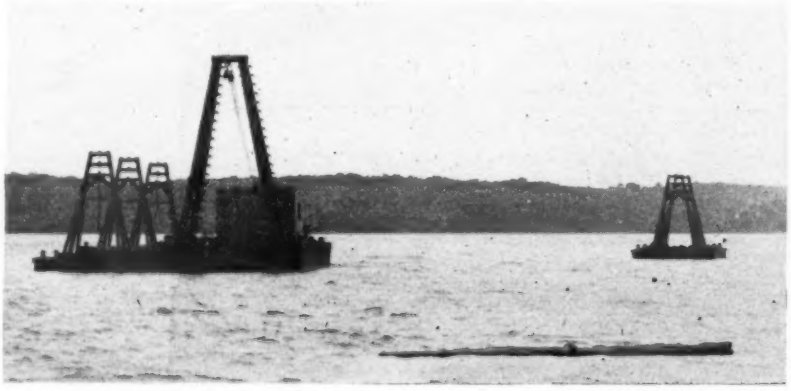
"Cleanup" Method

In the cleanup operations involving the obtaining of sands from the "pockets" in the lake bottom an especial watch must be kept on the discharge line to determine when sand and when lake bottom is being dredged. When sand is being pumped, the discharge is a dark purplish color, but when the head starts pumping into the clay lake bottom, the discharge becomes lighter in color and has a yellowish tint. The screenman watches the discharge and signals with a semaphore attached to the top of the screen house when lake bottom is being pumped. The dredge operator indicates that he sees the semaphore signal by giving two blasts of the "Quincy's" whistle and he then moves the dredge to a new location.

Cleanup operations are conducted only in the summer for it is impossible to back up the dredge for cleanup in freezing weather because of ice formation in back of the pontoon line. The jet pumps located on the four corners of the dredge's deck keep the ice broken up inside of the pontoon line area but there is no means of keeping ice from forming outside of the pontoon line.

As the dredge nears the bank, which has a maximum height of 15 feet above water level, care must be taken by the operator that the suction ladder is not "hung up." As the suction ladder cuts its way into a new bank, material left under the ladder may imprison the ladder should a bank cave-in cover the top of the ladder also. To prevent a "hang up" of the ladder the operator must watch his pumping action so that he can pull out and make another sweep into the bank at a lower depth to get the material originally under the ladder that would cause the hang up. Six ladder jets that pump water under pressure into the material under the ladder help to prevent hang ups. No

● Floating derrick and extra pontoons anchored in Torch Lake near the dredge. The derrick is used in shortening or lengthening the pontoon line. Log in lower right is anchor buoy.



hang ups have been experienced on the "Quincy" in its 10 months of operation.

At the time of the writer's visit, the dredge was completing cleanup work after winter operations when the "Quincy" dug in about 900 feet from the original point of operation. After cleanup is completed more of the bank will be dredged and then the dredge will swing and pump northward, at a right angle to the present cut, so that during the winter months it will have bank protection on both sides. After next winter the cut will be L-shaped about 700 feet wide on each of the arms.

Best Dredging Results

It has been found that the best dredging results when the operator keeps his vacuum at an average of 23 lbs. and his pressure from 30 to 40 lbs., depending on the type of material being dredged—30 lbs. for the coarser material and 40 lbs. for the finer material. The discharge pressure and vacuum are inter-related with each controlling the other. The material being dredged is pretty much uniform in size and is mostly "slime," or ⅜" and under. There is occasional larger material and when this material is over the one-inch size of the holes in the discharge screen it is removed from the screen by the screenman. Timbers, logs and rocks occasionally come through the discharge pipe and are removed from the discharge screen . . . and once in a while the screenman is rewarded with a nice bass or pike that becomes curious and approaches too near the suction head of the dredge. Strange as it seems, these fish that are carried through the pump are not mangled or mashed and more often than not they are still alive and kicking when they hit the discharge screen.

Electric power for operating the dredge machinery is brought in on lines strung along an overhead structure on the pontoons at 2,300 volts d.c. to transformers on the dredge. The main pump and the two jet pumps are operated at 2,300 volts, and the rest of the electrical equipment on the dredge, except the overhead crane and priming pumps, are operated at 440 volts. The current is reduced to 110 volts for the crane and priming pumps. All power used is metered on the dredge and the average monthly consumption varies little from month to month. A little more power is used during the winter months when the deck jet pumps are in operation. The dredge was operated 365 hours in January and used 262,000 kilowatt hours of electricity and it was operated 304 hours in May and used 257,000 kilowatt hours, or an average of about 11,000 kilowatts per eight-hour shift.

The main pump is equipped with an innerliner and the pump is taken down every two or three weeks and the innerliner is built up by welding with Stoody high carbon rod. The first main pump innerliner was worn beyond repair after 1,814 hours of service.

Discharge Line

Under operating conditions at Torch Lake the longest discharge line from the dredge, including pontoon and shore line, would be 3,800 feet and the shortest possible discharge line would be about 600 feet. The average length of the discharge line during operations will be about 1,000 feet. At the present time the "Quincy" is operating with 1,300 feet of discharge line, 700 feet of shoreline and 600 feet of floating line. The maximum height of the discharge line is six feet, at the discharge screen. The line pipe is a little smaller than the suction pipe. The suction pipe is 20" I.D. and the line pipe is 20" O.D. The pipe is made of high carbon steel. The wall of the suction pipe is ¾" thick and the wall of the line pipe is ½" thick.

Pontoon Line

The pontoon line is made up of sections of 60' length pipe joined with

(Continued on page 440)

● **Crew of the "Quincy" (day shift crew on top and night shift crew below). E. J. Hauswirth, dredgemaster, is to the extreme right of the upper picture.**

Building Hydroelectric Plant in Califo

Total excavation amounted to 1,630,000 cubic yards in the construction of this $30,000,000 project built on banks of the Pit River in Shasta County, California.

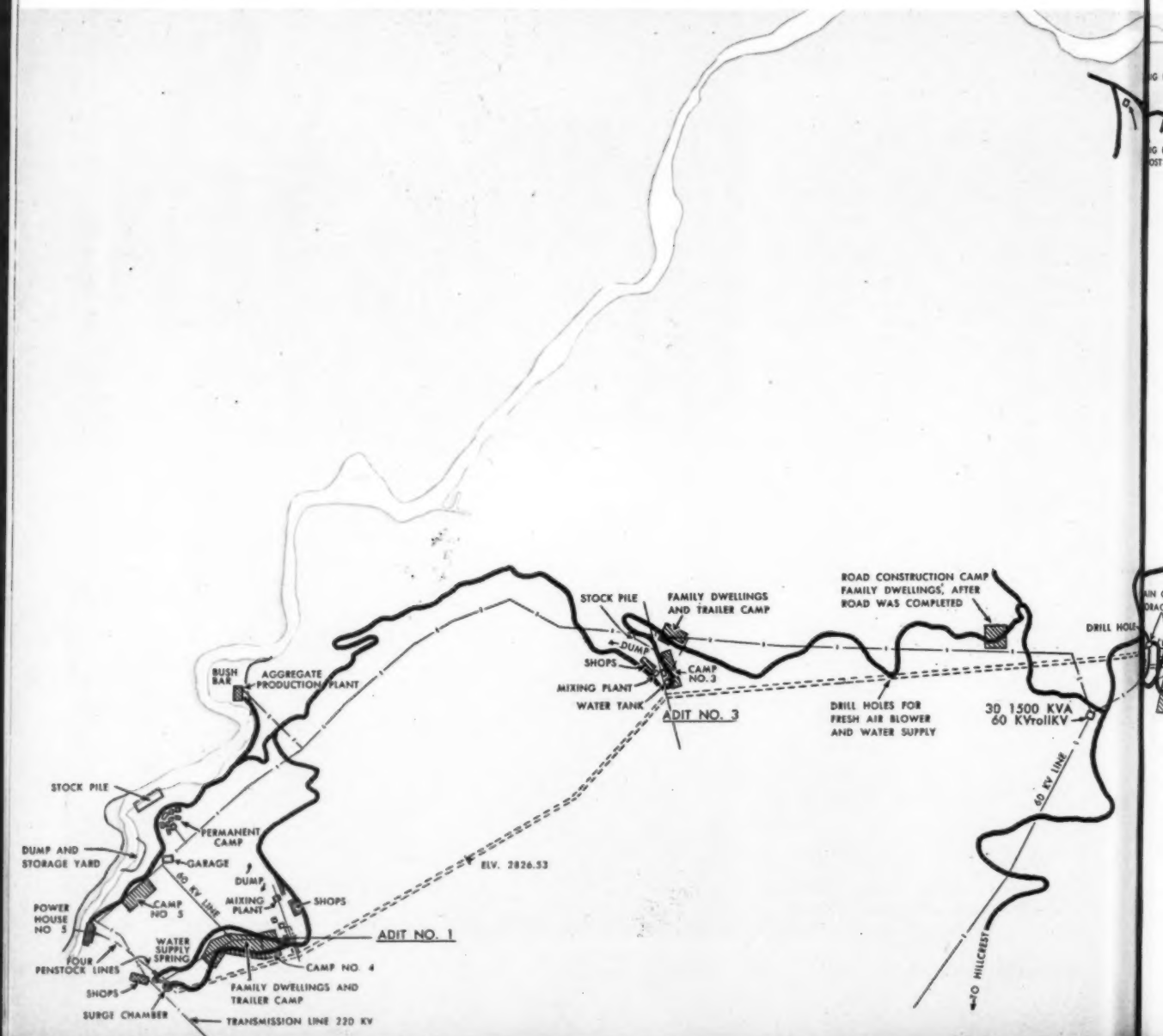
By EARL M. SEEL
(Pacific Gas and Electric Company)

EVERY POSSIBLE speedup practice in construction was employed in building the new hydroelectric plant Pit 5 of the Pacific Gas and Electric Company in order that its power might speedily be available to meet the needs of war industries and other electric users in Northern and Central California, the territory served by the interconnected electric facilities of the utility company. This plant, which was placed in service on April 29, 1944, has a generating capacity of 214,000 horsepower and is one of the largest hydroelectric installations to be built on the mountain streams of the Pacific Coast. Its construction required two and a half years and an investment of approximately $30,000,000. Practically all of the excavation work on Pit 5 was by the contracting firms of T. E. Connolly, Inc., and Hanrahan Company of San Francisco.

Geography of Activities

The new hydro plant is situated on the banks of the Pit River in Shasta County, California, about 59 miles east of the city of Redding. It is the fifth hydroelectric plan built by the P. G. and E. Company on the Pit River and its tributaries in pursuing a long-range water power development program established more than 25 years ago in the Pit River region.

The Pit River rises in the Cascade Mountains of northeastern Califor-



fornia's Pit River Country

nia. It carves a deep canyon in its path through the so-called Pit River Basin en route south and west to form a juncture with the McCloud River before emptying into the Sacramento River. The country through which the Pit River traverses is of lava origin, mountainous, wild and rugged with heavily forested mountain flanks. The Pit Canyon is a succession of spectacular gorges and waterfalls and is rich in natural beauty. Occasional valleys break the canyon's high, precipitous walls.

It is axiomatic along the Pacific Coast that as one goes north, seasonal rain and snowfall increases. The heavy precipitation in the Pit River Basin largely sinks into the porous lava rock and is caught and stored in underground caverns and rock fissures to emerge later as giant springs which contribute to the stream flow of the Pit River. This oddity of natural water storage calls for a different pattern of construction for power purposes than that used in building plants on the Sierra streams. The underground water storage of the Pit provides almost a constant stream flow with only moderate floods during run-off season. These factors obviate the necessity of building costly storage dams for river regulation.

The scene of Pit 5 construction activities was located in what is known as the Big Bend section of the Pit River, where the stream makes

EXCAVATION STATISTICS

OPEN CONDUCT

Length ..... 3,185 feet
Earth-fill embankment on downhill side 2,800-feet long by 60-feet high with 56-feet wide siphon spillway and flume to river.
Excavation ..... 766,000 cu. yds.

TUNNEL

Length ..... 5.33 miles
Diameter ..... 19 feet
Excavation ..... 600,000 cu. yds.

SURGE CHAMBER

40 feet to 58 feet in diameter by 96-feet deep
Excavation ..... 39,400 cu. yds.

DIVERSION DAM

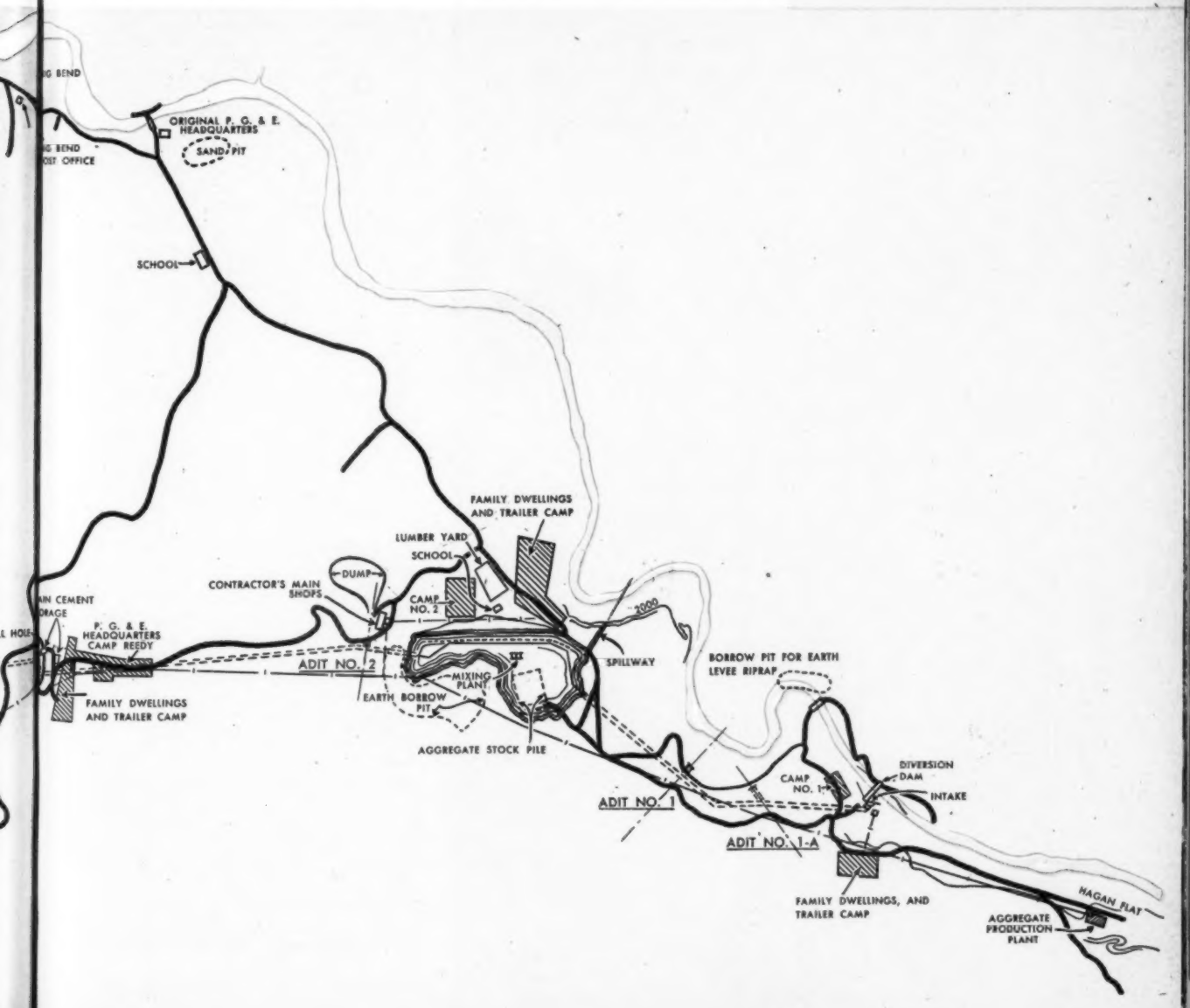
Excavation ..... 97,000 cu. yds.

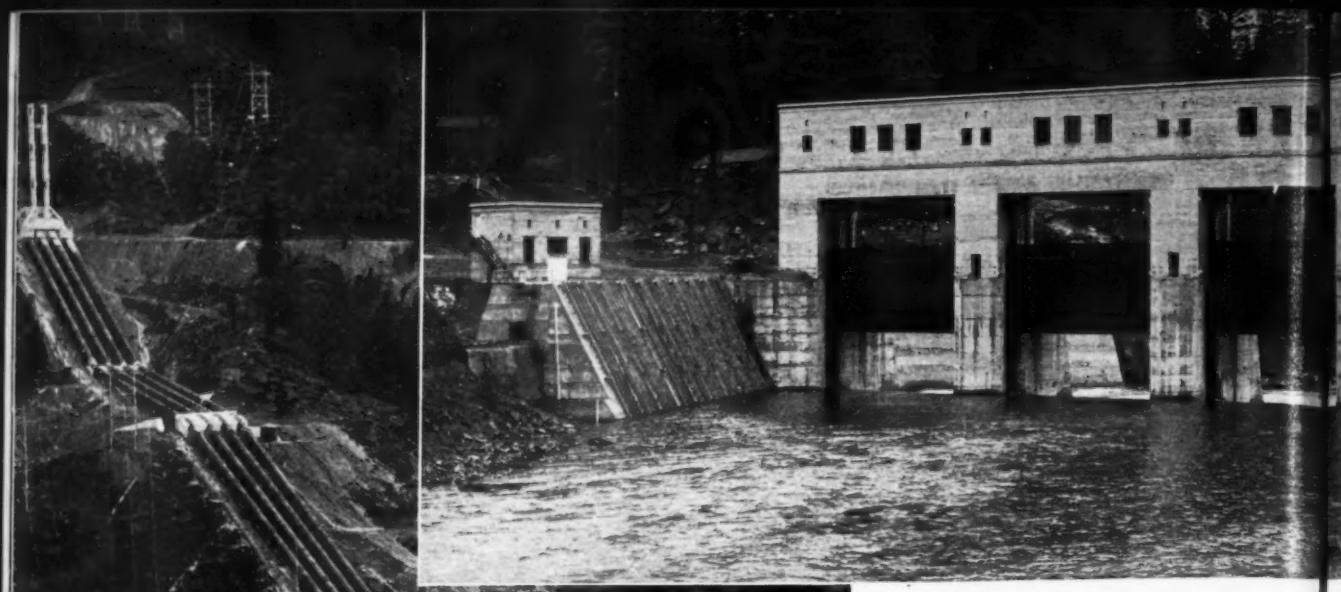
PENSTOCKS

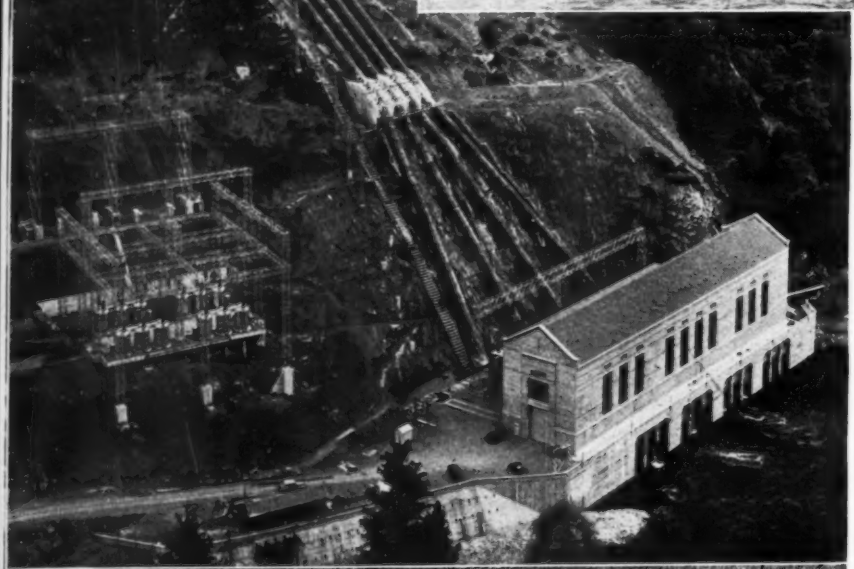
Excavation ..... 20,700 cu. yds.

POWERHOUSE AND RELATED STRUCTURES

Excavation ..... 93,000 cu. yds.
Total Excavation.... 1,630,000 cu. yds.







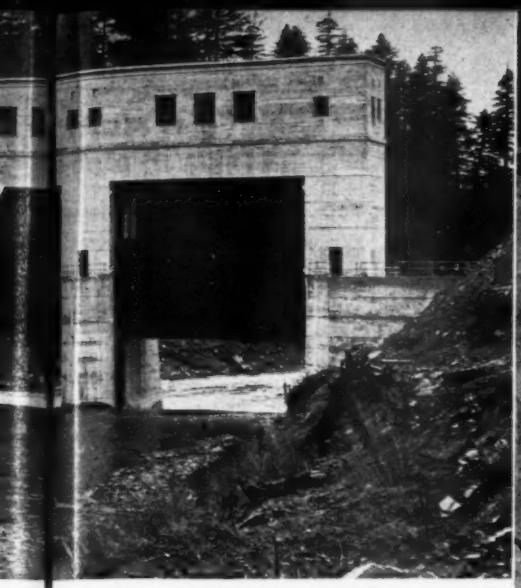
● **Above: Diversion works showing the upstream face of the diversion dam with the dam gates, each weighing 90 tons, in raised position. Intake structure for the diversion tunnel which carries water to the powerhouse is to the left. Upper Left: Completed Pit 5 powerhouse and penstock lines. Lower Left: Power shovel excavating huge surge chamber.**

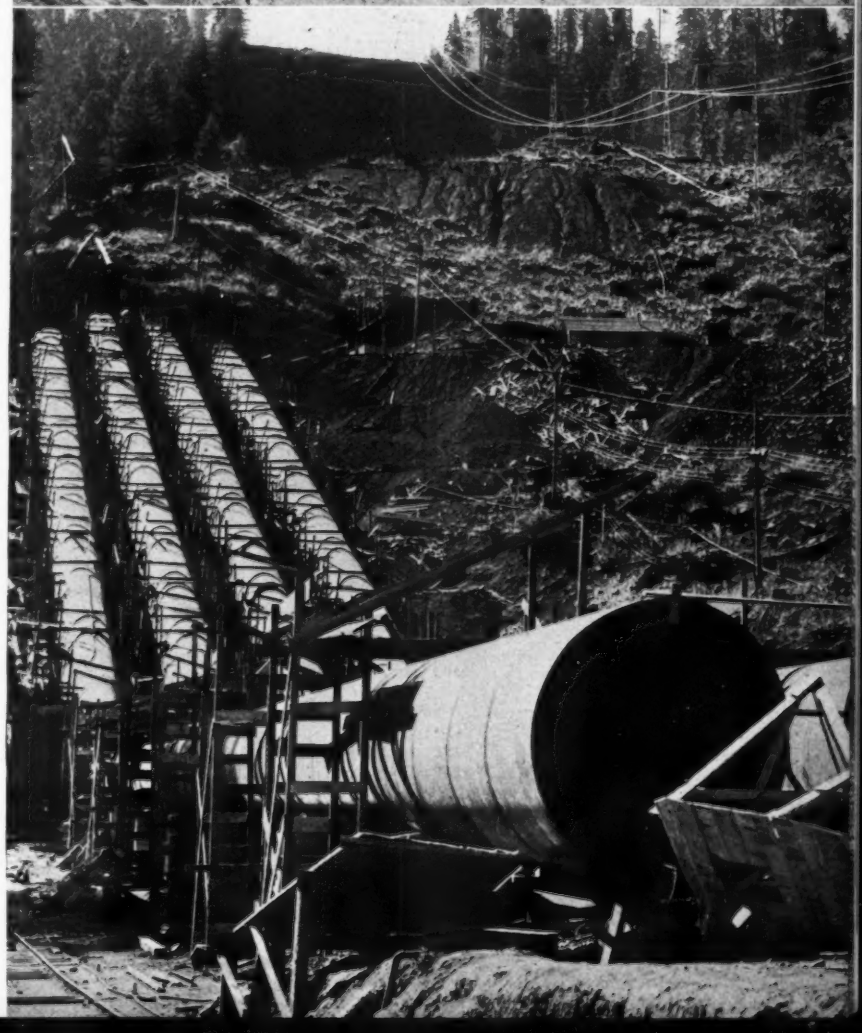
a wide turn ten miles long to form the bend. It is six miles straight across from the start of the bend of the powerhouse site. The general construction features of the project involved are: (1) a reinforced steel and concrete diversion dam across the Pit at the beginning of the Big Bend; (2) a tunnel and open conduit across the neck of the bend to a point in the river canyon wall overlooking the powerhouse; (3) a penstock system consisting of four units leading from a large surge chamber at the tunnel outlet down to the powerhouse built on the river's bank; (4) the powerhouse and its appurtenances; and (5) a 15-mile 220 kv transmission line connecting the plant's capacity to the company's electric system.

Preliminary Construction

Before starting actual construction at Pit 5, it was necessary to install a number of facilities for the project. Roads had to be built, a number of permanent camps had to be installed for the project workers and power lines were extended to the different working points. The highway work was done by various contractors. W. A. Bechtel Company of San Francisco did the grading and E. B. Bishop of Orland, California, supplied and placed crushed rock for certain sections. Small power shovels, bulldozers, and trucks were among the equipment used.

Providing a highway suitable for heavy trucks proved to be a major task. The only road into the Big Bend





● **Upper Right: Open conduit levee approximately one-third in place. Lower Right: Penstocks in process of installation.**

district was a dirt county road branching from the Redding-Alturas highway near Hillcrest, and winding through rugged mountains with many steep grades and narrow curves. Road crews started working in July, 1941. The county road was re-graded, curves were straightened and a new surface laid. Culverts were installed and bridges strengthened. In addition to the 15-mile stretch of this principal traffic artery, another 15 miles of roadways were built to reach the essential working points. The road contractors built roads which rivalled in efficiency the nearby state highway. These roads carried more than 250,000 tons of material during the construction period. And many of the individual loads weighed as much as 50 tons.

Simultaneously with the road building activities a 60 kv 29-mile transmission line was installed to provide the necessary power for the project. This line tapped one of the utility company's transmission lines leading to the other Pit River hydro plants. A central substation was established and 11 kv lines radiated to all working points.

Permanent camps were built to house the more than 2,000 workers. Many of the workers' families accompanied them and additional trailer camps were provided. The different camps were complete with schools, a general store, a movie theater, and all necessary utility service.

The Diversion Dam

Because of stream-flow conditions peculiar to the Pit River, the diversion dam differs materially from other dam types. It is a concrete over-flow gravity type structure. Actually the

● Downstream section of by-pass flume from temporary diversion dam.

dam merely is a slab of concrete built across the stream for the purpose of diverting water into the tunnel. It is 310′ long and 110′ high from stream-bed to the top of the gate house. It has four steel crest-gates which are electrically operated. These gates are counterbalanced and each measures 50′ by 26′4″ and weighs 90 tons.

Before construction could start on the main dam, a temporary diversion dam was built about 600 feet upstream from the damsite. The temporary dam was started in March, 1942. The stream-bed was cleared of boulders by drilling off a barge through water from four to six feet deep and blasting. Log cribs 10′x45′ were erected on the left bank of the stream, launched, loaded with rock and by means of a high line spanning the river, swung into position and sunk. Additional timbering raised the cribs 27 feet above the stream bed.

While the temporary dam-cribs were being constructed, excavation was started on the right abutment of the main dam. A total of 28,000 cubic yards of material was removed. This figure includes 5,000 cubic yards excavated for a bench situated on the right bank of the stream just above the water line. On this bench a timber flume 25′ wide and 14′ deep was installed to carry the stream flow past the main damsite. At the left abutment, power shovels, Dumptors and trucks removed 56,000 cubic yards to widen the river and provide the necessary spillcrest for the tunnel intake.

Concrete mixing plants were established near the dam's left abutment to facilitate pouring. The concrete was deposited by means of a high line cableway and also by trucks and a crawler crane. Concrete for the tunnel intake came from the same plants by means of a crane and a stiff leg derrick. The derrick also was used in excavating the intake and a short section of the tunnel. This tunnel section drops 15′ below the intake wier lip. Both the dam and the tunnel intake required 18,000 cubic yards of concrete.

Tunnel Driving

Extending from the diversion dam the tunnel follows the shortest course across the neck of the Big Bend. Its entire length is 5.33 miles which figure includes 2,900 feet of open conduit. The geological formations through which the tunnel was driven consist of sandstone and slate overlaid with a thick deposit of cemented conglomerate. This conglomerate, in turn, was overlaid with sandstone, waxy shale, tuff, and lava slide breccia.

The engineers decided to start construction from four adits. The adits were established in ravines where the tunnel could be brought close to the surface and also where suitable dumping ground was available.

Several reasons motivated the decision to begin work on four adits at once. The construction schedule called for speed as the capacity of Pit 5 was needed to provide power for the wartime industrial areas of Northern California. Shortage of labor generally affected the entire project and it was difficult to obtain sufficient numbers of skilled workmen to work in such an isolated area when other jobs were to be had for the asking in the numerous war-industrial plants situated in metropolitan districts. Priorities affected the project's working conditions since it was difficult to

(Continued on page 437)

● Excavating for powerhouse foundations.

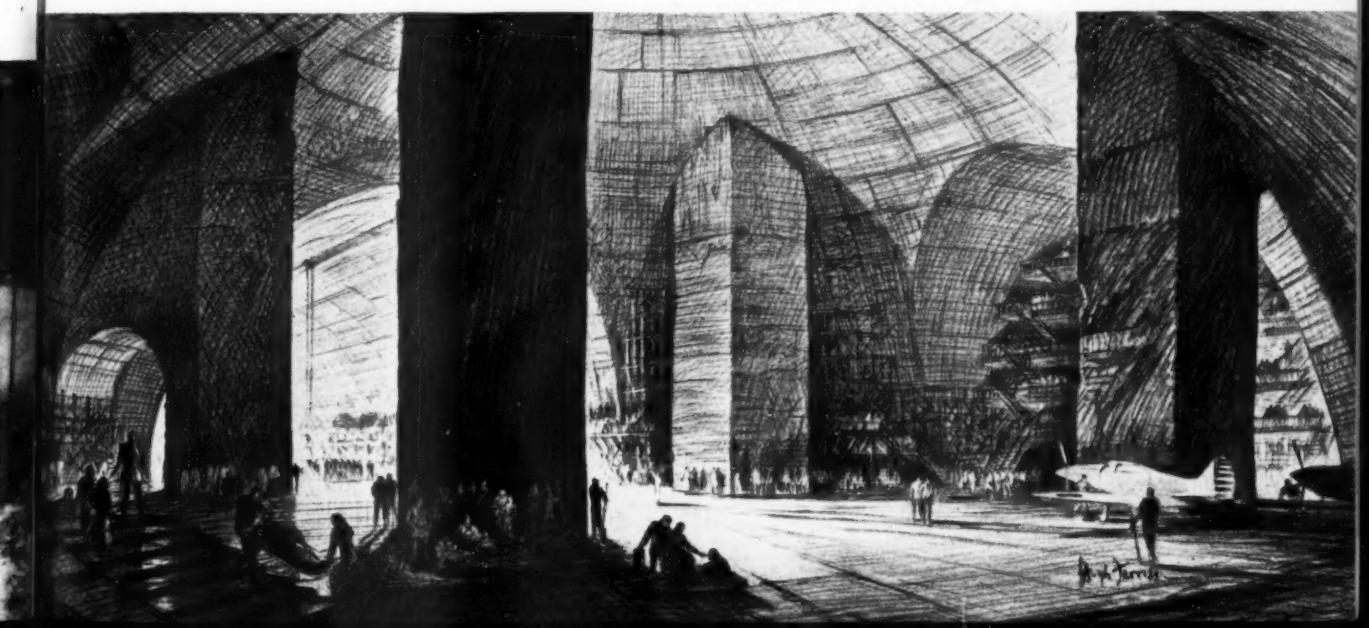
BOMB PROOFING

ALTHOUGH NOT NOW faced with immediate danger of an enemy "sneak raid" on our country, plans for protective measures made back in 1942 are interesting and many of them may prove of value in the future.

The New York area, being on the coast and playing such an important part in the war effort through its transportation and harbor facilities, would be in especial need of protection should bombing of our cities become a reality. Transports on the Hudson River awaiting convoy, millions of dollars worth of equipment awaiting shipment along the west shore, and the dependence of transportation on the George Washington bridge makes New York an especially vulnerable target.

However, the New York area also provides natural topography for bombproof facilities in the rock cliffs on the westerly bank of the Hudson River. George J. Atwell, specialist in rock excavation and tunnels and John C. Evans, chief engineer of the Port of New York Authority, suggested the protection scheme illustrated by Hugh Ferris on this page.

The top drawing shows tunnels built through the rock cliffs of the Hudson to the Hackensack Meadows for the purpose of storage, manufacturing, hospitals, airplane hangars and other wartime uses. Chungking, Dover and Malta have been saved from bombing by such tunnels. Bottom: Interior view of a room carved out of solid rock — without the use of essential war materials.



Field NOTES

Safe, Practical Hanger

During the summer months overclothing is often temporarily removed and put back on as temperature conditions change in and around the machine cab. Nails, hooks, and similar means of hanging them up are unhandy, even dangerous when put up in the close quarters of the cab. Nail heads too, are mighty hard on clothing.

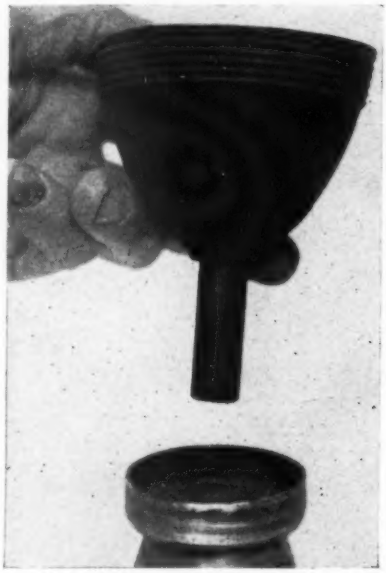
Very neat, safe and practical devices for this can be readily made of large coffee can or similar opener keys. Bend the handle or oblong eye of the opener to an agle with the slotted key, and with small nails fasten down to a spot convenient and easy to reach. Such a hanger is strong, cannot scratch or cut the hands, and is very practical for caps, hats, jackets, vests, light coats and similar pieces of clothing one wishes to remove for the time, yet keep handy and near. It is impossible to get cut or scratched on it, no matter how you come in contact with it.

By FRANK BENTLEY

● Large coffee can opener keys make neat, safe and practical hangers for light articles of clothing around the cab where nails and hooks are dangerous.

Homemade Rubber Funnel

There is nothing around the machine more handy and useful than a small funnel, but the light tin ones usually available can't stand much abuse and do not last long. Here is a home-made funnel that can "take it." The bowl is an ordinary inexpensive plain gear shift boot. The tube



● Common inexpensive rubber parts make a small all-purpose funnel that can stand rough usage.

is made by cutting off the upper or long portion of an attachment plug cap, an electrical gadget found on any electrical supply counter. Cut the rubber plug cap off removing the bowl portion, but leaving the small round shoulder at the neck. This neatly seats at the very bottom of the boot when the tube is drawn down through the hole at its tip. If the tube starts a trifle snug, use a bit of oil. As this funnel is entirely of rubber, almost any fluid, even acid can be used in it. It is easy to clean, and can be stepped on, mashed, even run over by the machine, yet it will come back into perfect shape and still be a good funnel.

Electrocution Danger

A new method of seismic prospecting near power or transmission lines, developed by Robert L. Klotz, Jr., a Hercules Powder Company explosives engineer, has greatly reduced the danger of electrocution connected with this work, according to reports received by Hercules.

The new method utilized, by some of the nation's biggest geophysical prospecting companies, consists of a detonating fuse called Primacord to prevent circuit wires, used to set off explosive charges, from being thrown into the air by the force of the explosion and making contact with power lines.

In the past instances of severe electric shock, some with fatal consequences, have resulted when the circuit wires, often still connected to the blasting machine at the firing point, were blown into contact with power lines.

In seismic prospecting or surveying, the earth's subsurface structure is explored, usually for oil deposits.

This is done by first drilling a hole anywhere from a few feet to 450 feet deep and placing an explosive charge close to the bottom of the hole. The charge is connected to a firing circuit, the firing circuit to a recorder and the recorder to a number of seismometers. When the explosive charge is fired, waves are created and the time of arrival of the waves are recorded. From these recordings, the data on the sub-surface structure are calculated.

When the explosive charge is detonated, the lengths of wire extending into the borehole are often blown into the air.

If enough wire is strung down the borehole to reach to the power line when blown out of the hole, a serious hazard to the men at the shooting point, and sometimes even at the recorder, is created, because the wires may come into contact with power lines.

By using Primacord, a detonating fuse consisting of an explosive core covered with a waterproof textile covering, as either a substitute for the circuit wire extending into the borehole or as a means of destroying the wire, the possibility of the wires making accidental contacts with power sources above the ground are greatly reduced, because Primacord either destroys itself or can be arranged to destroy the wire.

● A template developed by a contractor in the field, for use with the Davey Pneumatic Saw, makes possible the mass production of any cut that can be made with the hand saw. The template, shown in the illustration, may easily be made by the contractor. It may be fastened to the Davey Saw or to the timbers.

U. S. Signal Corps Photo.

TODAY
A JUNGLE
TOMORROW
A RUNWAY

WILL THEY EVER mount a Diesel Tractor alongside the cannon on a courthouse lawn to honor this great combat weapon? Anyway, it's an idea! For here's a peace-time builder that's a sensation on the battlefield, winning praises from GIs and Generals alike—moving dirt, rock, sand, frozen tundra and jungle swamp—by the ton and in a hurry.

Tens of thousands of International Tractors are serving the military—in the Army, the Navy, the Marine Corps and the Air Forces. Tractors pave the way for airpower, footpower and firepower . . . *All honor to the men who drive them!*

While these tractors are fighting on the battlefront, it's up to all tractor operators to conserve equipment here on the home front. *Make it last!* Harvester and the International Power Distributors stand ready to see you through.

If your need for new equipment is vital to the war effort, we will have equipment for you. If your need is less vital we will safeguard your present International Power with every service at our command.

And in the meantime, let's all remember that it's up to all of us to fight harder on the home front . . . fight on the food front—give to the blood bank—buy extra War Bonds—fight inflation. FOR VICTORY.

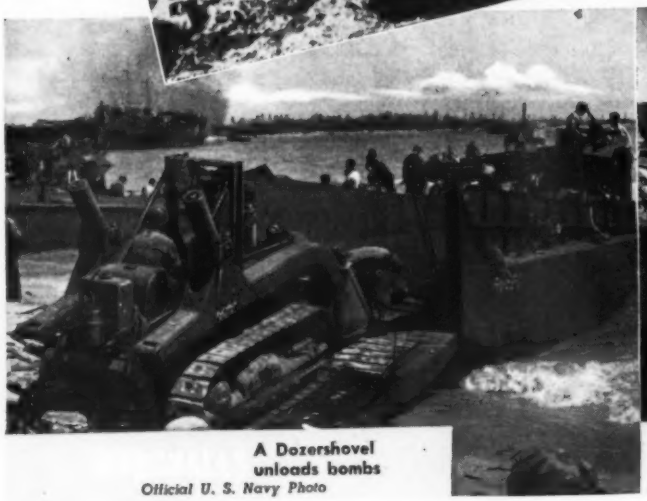
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

INTERNATIONAL HARVESTER

Power for Victory . . . Power for Peace

THE WEAPON THE AXIS DIDN'T HAVE

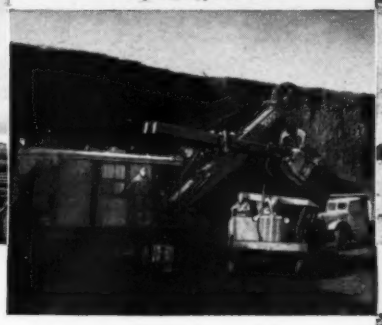
NORMANDY A Bullgrader cleans up
French Combine Photo



A Dozershovel unloads bombs
Official U. S. Navy Photo

A Bullgrader hauls ammunition
Signal Corps Photo

A 20-B loads landing mats
Signal Corps Photo



A 54-B builds a road
Signal Corps Photo

A 15-B grades an airstrip
Signal Corps Photo

A 15-B builds a road
Signal Corps Photo

Shovels, bulldozers, cranes, and scrapers are doing the same basic things now they did before the war. Yet our enemies, for all their years of preparation, failed almost completely to recognize the potential military value of dirt moving equipment. In the hands of American men, long accustomed to brilliant use of machines, excavating equipment is truly a double-edged sword, efficient in war and peace. V-63C

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

Two 22-B's unload rations
Signal Corps Photo

A 4-wheel Scraper grades the Alcan Highway
Engineering News-Record Photo

A 22-B grades an airstrip
Official U. S. Navy Photo

Shots from the FIRING LINE

Civil Engineers Set Goal of $15 Billion in Plans

The goal of the American Society of Civil Engineers' Committee on Postwar Construction is to have plans ready for bids by July 1, 1945 totaling $15 billion. Of thus sum, $10 billion is estimated to cover civil engineering construction, and $5 billion covering the so-called "non-engineered" work such as maintenance, housing built by handcraft methods and other light construction.

From an analysis made by the Committee's Division of Research and Development of the volume of prewar engineered construction, postwar potentials have been set up as follows:

Classification	Millions
Waterworks	$ 320
Sewerage	360
Streets and Roads	1,970
Bridges	480
Earthworks	590
Unclassified	1,130
Buildings:	
Public	1,280
Industrial	1,060
Commercial	2,810
Total	$10,000

For the 17 months ending May 31, 1944, the total volume of postwar construction for which "plans are underway or completed" in the United States is only $2,655.2 million. Of this sum 54% is reported from the States of New York, Ohio, Texas and New Jersey, ranking in that order. Over 81% is reported as being in only 12 states. This indicates that too much postwar planning is still in the "talking stage."

Upward Trend in Crane, Shovel Industry Continues

The upward trend in the operations of the power cranes and shovels industry was continued during the first quarter of 1944 when shipments exceeded 2200. This was 44 per cent more than in the corresponding quarter of 1943. Unfilled orders totalling 12,783, four years' production at 1937 rates, represent the interest the military have in an item of peacetime equipment which has become vitally important at advance bases and even in combat operations.

• **Caterpillar D8 tractor hauling Athey Trailer loaded with supplies down steep ramps of landing craft on the reef off the island of Nanomea in the South Pacific.**
U. S. Marine Corps Photo

Shipments of the crawler mounted types increased 10 per cent over the preceding quarter and although the increase in the number of truck mounted cranes and shovels was less than 5 per cent, their great value to the military (to whom they are entirely restricted) is illustrated by first quarter shipments when almost twice as many were shipped as were shipped during all of 1937.

Among the essential jobs performed by this equipment at home and in the war zones are digging foundations and trenches, dredging, pile driving, lifting and moving dirt, material and cargo handling, assembling big guns, etc. Each machine is usually equipped with additional attachments which quickly enable the operator to turn from one type of operation to another.

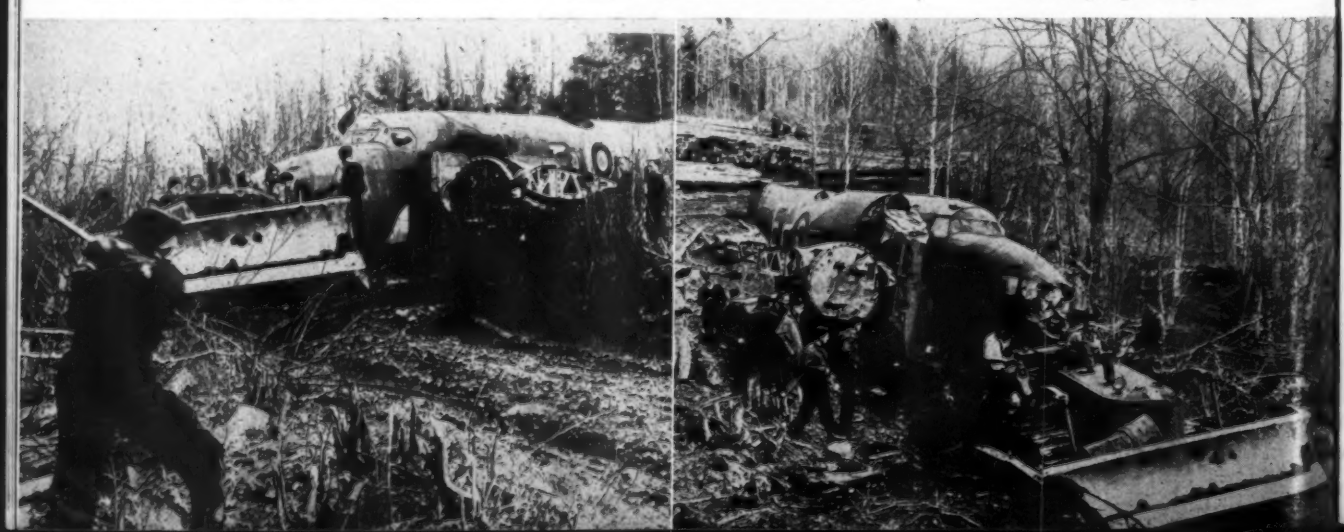
These data are based on reports representing 100 per cent of the industry: in 1943, 22 producing companies reported; 26 companies reported for the years, 1937-1941.

(Number of Cranes and Shovels)

Year and Quarter	Crawler Mounted	Truck Mounted	Total
Shipments			
1937—Total	2974	312	3286
1938—Total	2260	213	2473
1939—Total	2503	243	2746
1940—Total	3216	378	3594
1941—Total	4191	835	5026
1943—Total	5291	1937	7218
1943—1st	1167	370	1537
2nd	1238	485	1723
3rd	1431	497	1928
4th	1455	575	2030
1944—1st	1618	594	2212
Unfilled Orders			
1943—Dec. 31	5486	2477	7963
1944—Mar. 31	9393	3390	12783

List Nine and a Half Billions in Postwar Projects

Construction projects contemplated for execution in the postwar period have been reported by F. W. Dodge Corporation to the number of 41,805, with an estimated total cost of $9,581,538,000. These projects are all contemplated for the 37 states east of the Rocky Mountains; similar listings for the 11 Western states would probably



• **Following the crash of this RAF bomber in the heart of a Nova Scotian forest a crew of 70 men came to the rescue and with the aid of a Bucyrus-Erie Bullgrader constructed a 14-mile road through the wilderness and hauled out the plane. The complete salvage job took five weeks.**
U. S. Army Signal Corps Photo

TYPICAL DIESEL LUBRICATION PROBLEMS:

3. Ring-Sticking

Ring-sticking usually results from deposits formed by the combination of the residues of oxidized lubrication oil and fuel with fuel soot.

In four separate ways, RPM DELO prevents the formation of these deposits:

1. RPM DELO is manufactured from a carefully selected base oil containing natural inhibitors highly resistant to oxygen. It contains no heavy residues which may be left behind to act as a binder for the fuel soot.

2. RPM DELO contains an added oxidation inhibitor which greatly reduces the rate at which the oil absorbs oxygen.

3. RPM DELO has chemical detergent properties. The compounding material reacts with the oxyacids to render them essentially inert so that they are no longer able to polymerize to form gums and lacquers.

4. RPM DELO has peptizing properties which enable it to maintain soot and oxidation products in suspension in minute particles. This prevents these materials from settling from the oil and forming engine deposits.

RPM DELO, moreover, is non-corrosive to all types of bearings, does not foam and has very high metal adhesion qualities at both high and low temperatures.

RPM DELO is marketed throughout the United States and many foreign countries under the following names: RPM DELO, Caltex RPM DELO, Kyso RPM DELO, Signal RPM DELO, Sohio RPM DELO, and Imperial-RPM DELO (concentrate).

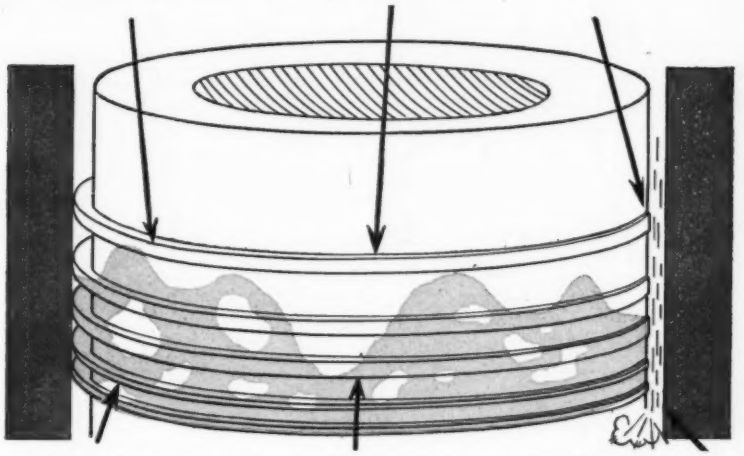
☆ ☆ ☆

HOW RING-STICKING OCCURS

Decomposition products of fuel and lubricating oil deposit in ring groove, behind ring and in side-clearance space.

Rings stick in grooves, no longer expanding to form tight seal between piston and cylinder wall.

With seal broken, hot, high pressure gases "blow-by" stuck ring.



Escape of gases reduces compression, overheats piston, increases oil deterioration.

Blow-by pressure removes lubricating oil from rings and cylinder, leaving dry spots.

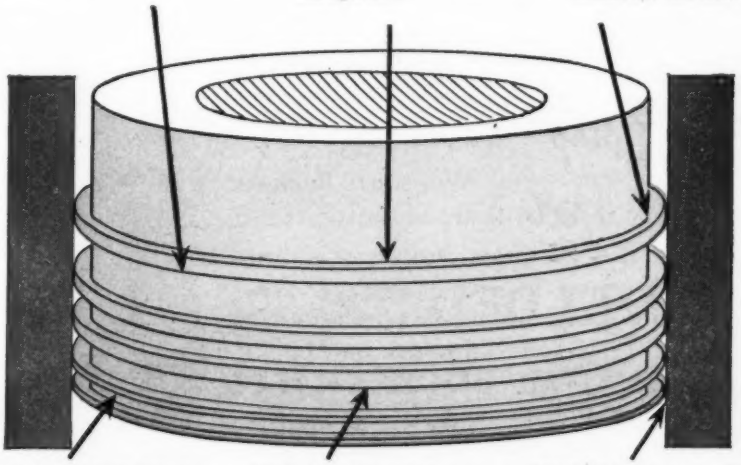
Lack of lubrication results in high ring and liner wear and scratching.

HOW RPM DELO PREVENTS RING-STICKING

Detergent in RPM DELO prevents deposition of oxidation products.

Ring grooves are kept clear, allowing ring tension to maintain tight seal.

RPM DELO clings to ring surface, maintaining lubricant film and seal.



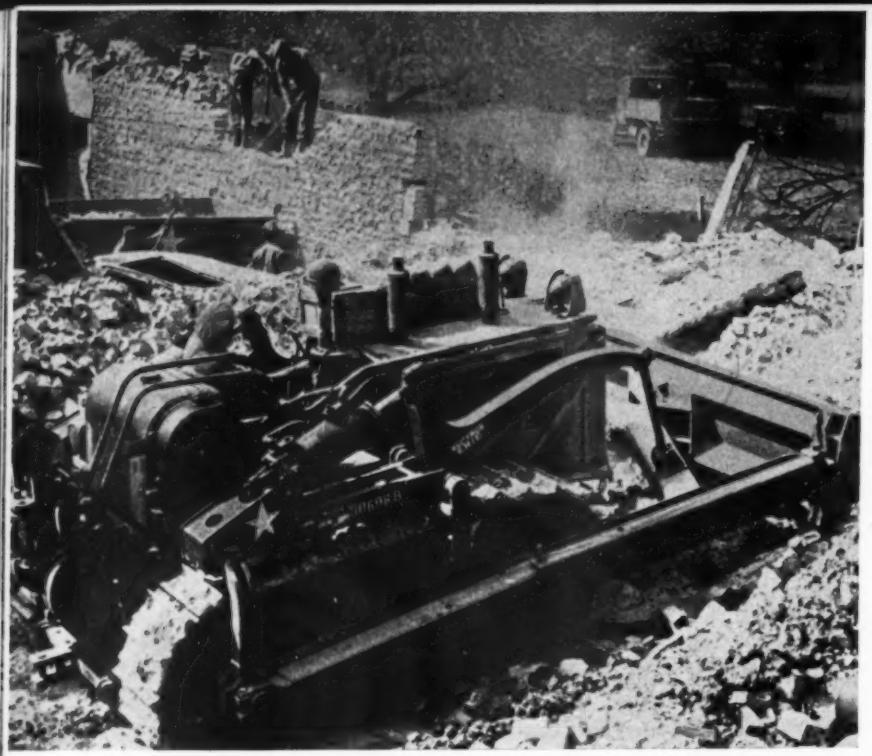
Tight seal eliminates blow-by, maintaining compression and power.

RPM DELO adheres to hot surfaces, protecting entire surface of rings, piston and liner.

RPM DELO lubrication results in minimum ring and liner wear, eliminates scratching.

RPM DELO

STANDARD OF CALIFORNIA



• Royal Engineers use American-made Bucyrus-Erie Bullgrader to clear Normandy road of debris from a wrecked building during the invasion of the Continent. This type of equipment played an important role in the Invasion.

British Combine Photo

increase the total by some 20 per cent, according to the Dodge organization. The project list has been accumulated during the past 21 months, and additional project reports are being received daily. Forty per cent of the projects by number, and 45 per cent by value, have been reported in the design stage.

Give Production Figures On Construction Machinery

Poduction of all construction machinery increased from $247,529,000 in 1937 to $721,690,000 in 1943, according to figures presented by Henry M. Hale of the Construction Machinery Division of WPB at a meeting in Washington, D. C., of the Overall Construction Machinery Industry Advisory Committee.

Production for 1943, as compared with the number of units made in 1937, for typical types of equipment, is given in the following table. Estimates for 1944 are shown for leading items.

ITEM	NO. OF UNITS 1937	1943	Est. 1944
Tractors (track-type only)	34,602	25,170*	30,000
Allied Tractor equipment:			
Dozers	—	16,113	23,000
Scrapers	967	5,054	4,000
Tractor cranes, shovels	380	4,756	4,000
Power cranes, shovels:			
Crawler mounted	2,974	5,291	—
Truck mounted	312	1,937	—
TOTAL	3,286	7,228	10,000
Ditching machines	134	628	800
Graders:			
Motor	3,742	3,693	3,830
All others	3,818	1,627	—
Snow Plows	4,784	3,077	—
Miscellaneous items:			
Asphalt plants	40	238	—
Concrete buckets	287	269	—
Crushers	673	203	—
Screens	206	53	—
Distributors, bituminous	303	819	—
Heaters (surface, tank car, conc.)	581	426	—
Kettles, bituminous	2,331	2,700	—
Mixers, concrete	6,399	2,631	—
Pavers	102	148	—
Pumps	10,435	35,949	—
Truck mixers	739	261	—
Concrete finishers	151	302	—

* Loss due to curtailment of small sizes.

Repair parts for tractors, as well as

WELLMAN WILLIAMS TYPE BUCKETS

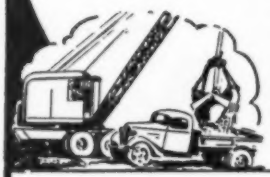
Staying Power

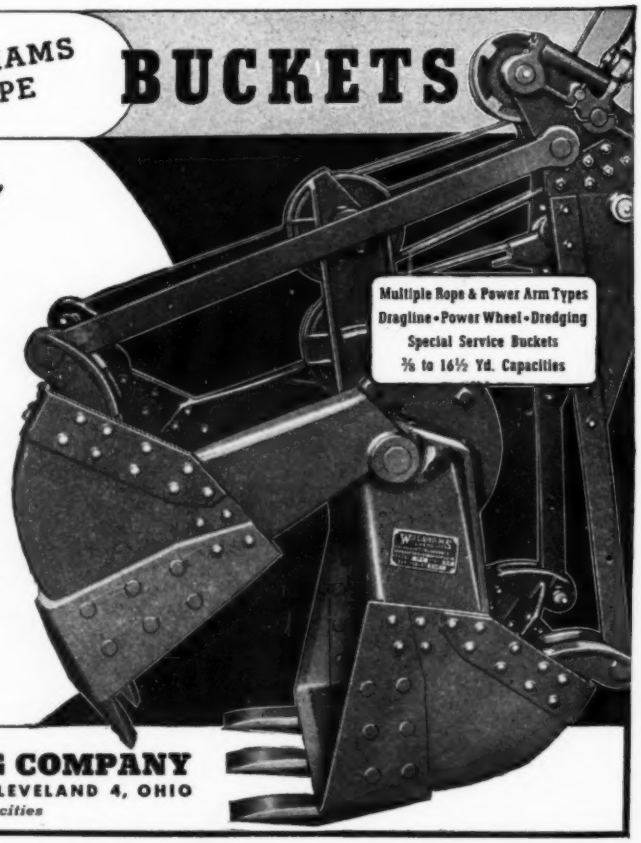
Wellman Buckets stay right in there slugging it out in the toughest, roughest going.

WELDED ROLLED STEEL CONSTRUCTION is one big reason for LONGER BUCKET LIFE!

Send for Free Bulletin

Tell us about your particular requirement and we will send full description of construction and special features in bulletins which clearly proves why YOUR NEXT BUCKET SHOULD BE A WELLMAN-WILLIAMS.





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Sales and Service Agencies in principal cities

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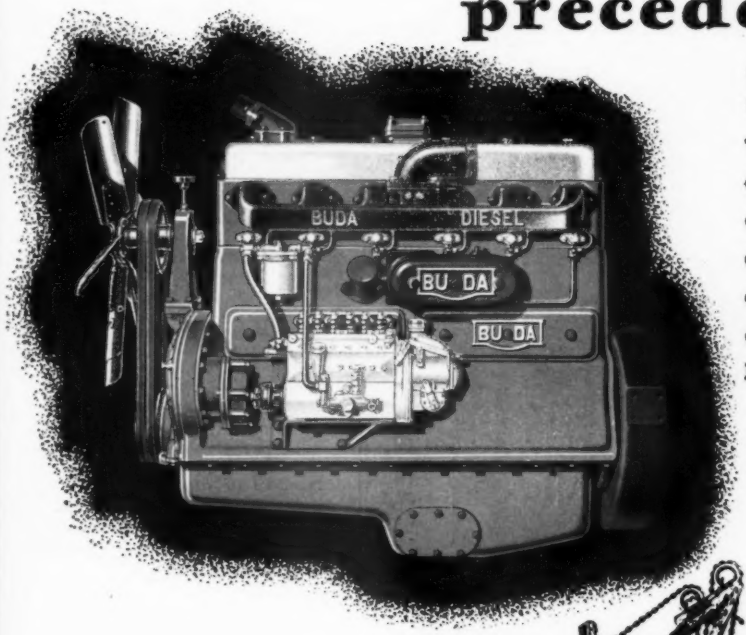
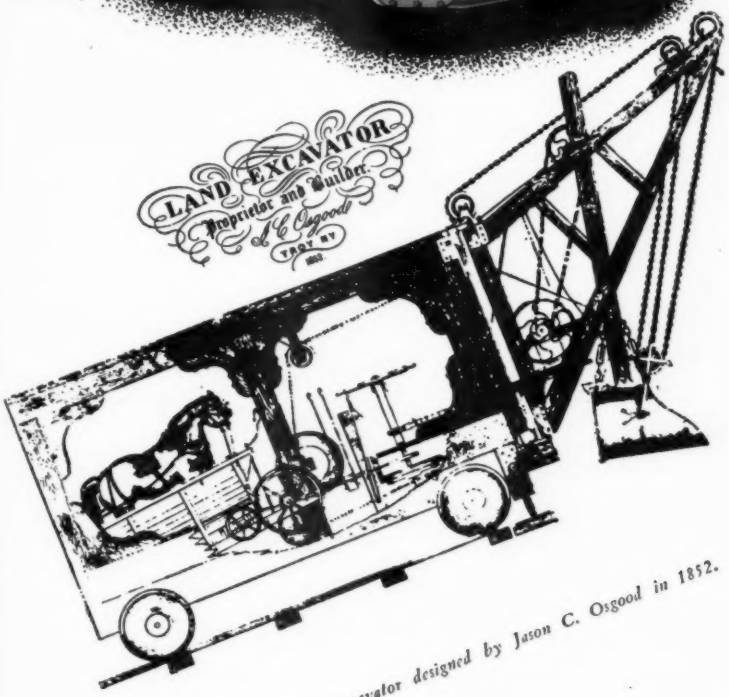
precedes progress



Excavating earth a century ago was a job that taxed the ingenuity of experts. The missing factor in equipment, otherwise fairly efficient, was modern power. Today you can have the finest, most efficient, economical power ever developed by specifying BUDA Diesels.



Two-Horse power Excavator designed by Jason C. Osgood in 1852.

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Service is Nation-wide

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other construction machinery, are somewhat easier to obtain, Charles L. Stebbins of the Construction Machinery Division reported. Certain parts, however, for tractors, shovels and cranes, and for self-propelled graders still remain critical. Stebbins believes that there are excess stocks of tractor parts in the hands of various contractors. He said that if these can be moved, the situation would be improved.

Ecuador Plans Network of Modern Highways

The new government of Ecuador plans to give strong impetus to public works and preferably to the construction of roads, according to Alberto Barriga Ycaza, representative of foreign firms in Guayaquil, Ecuador. He said that a program has been prepared for the construction of highways which includes 16 principal roads.

Ecuador has suffered a practical lack of highways. There is only one highway, from Quito to Riobama, in good condition. The remainder of the highways are merely coach roads which are only open a few months of the year—during the dry season.

One of the roads planned, from Rumichaca to Macara, will be completed first for it constitutes the connecting link with the Pan-American Highway which traverses the entire country from north to south.

The contemplated road system covers the vast reaches of the country to its most remote sections and also permits access to the wild eastern region which is unexplored. It will unite rich agricultural zones, which up to this time have remained undeveloped due to lack of roads.

Although the government has reserved funds for the construction of these roads, work will have to wait until the end of the war because of lack of road construction equipment at the present time.

• **Although the above photograph was taken about an hour after one of the most widely heralded personal feats of the war in the Pacific occurred last fall in the landing on Treasury Island in the Solomons, it has just been released by the Navy. Lt. Charles E. Turnbull and Aurellio Tassone, Seabees, stand in front of the blade of the LaPlant-Choate bulldozer that had been used to uproot a Jap pill box, burying 12 Japs and a 90-mm gun and two machine guns. Tassone operated the machine and was supported by Lt. Turnbull with a carbine.**

Official U. S. Navy Photograph

Blast Furnace Slag Output Figures for 1943

The total output of air-cooled screened and unscreened, water granulated, and lightweight slag for 1943 was 16,507,606 short tons as compared with 19,122,718 tons for 1942. Sales of air-cooled slag were four per cent less in 1943 than in 1942, and the average value per ton of screened declined two cents and unscreened three cents. These figures are based on a canvass, conducted by the National Slag Association, of the 32 companies that prepare blast furnace slag for commercial use. The results of this canvass were assembled in cooperation with the Bureau of Mines, United States Department of the Interior.

Air-cooled slag was used principally in the construction and maintenance of highways, access roads, airport runways, defense plant and housing projects, miscellaneous structures, and as railroad ballast and sewage trickle filter media.

Practically all of the commercial output is produced east of the Mississippi River, chiefly at steel centers located in Ohio, Alabama, Pennsylvania, and Il-

SPEED OUTPUT with GATKE SWING FRICTIONS

GATKE moulded Swing Friction for a NORTHWEST Shovel. Available for all models.

TREMENDOUS POWER—for effortless control—no let down when things get hot.

SMOOTH ACTION—for precision inching—no grabbing or chattering.

LONG WEAR LIFE—beyond comparison.

. . . These are some of the reasons why GATKE Swing Frictions help get the job done FASTER. Try them and compare results!

Moulded to finished dimensions in all shapes and sizes—LARGE or small.

Shipped from stock for popular shovels, cranes, hoists, etc. Just tell us what you need or send for literature.

GATKE QUALITY BRAKE LINING & CLUTCH FACINGS are made for ALL applications

Non-Metallic Bearings to Replace Bearings of Critical Metals

GATKE CORPORATION

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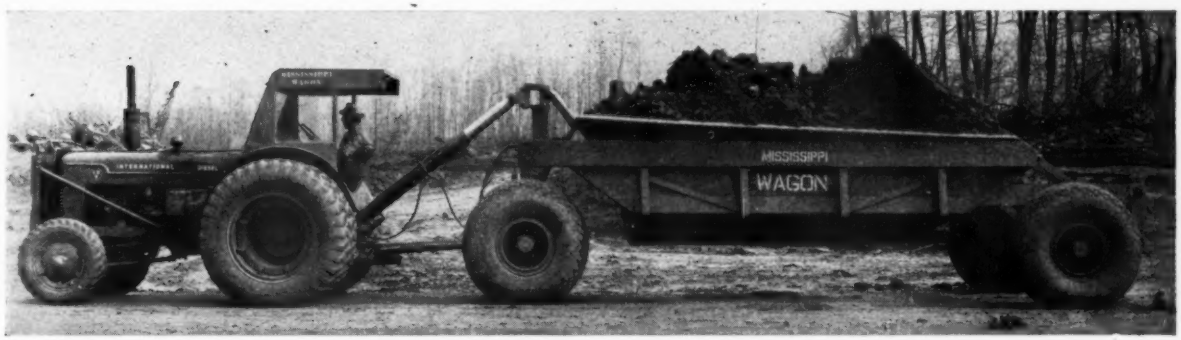


THE MISSISSIPPI WAGON IS YOUR MONEY-MAKER ON LONG, FAST HAULS AS WELL AS SHORT, TURN-AROUND HAULS

Every contractor knows the "beating" his tractors take during long fast hauls with the ordinary semi-trailer hauling unit. The constant pounding, surging and twisting of the loaded semitrailer mounted on the tractor is a continuous vicious attack upon it—always leading to the repair shop. Under such operations, long hauls become nightmares, and always lead to heavy expense due to repairs on transmissions, etc.

This is NOT THE CASE with the MISSISSIPPI WAGON, the world's most modern hauling unit. On long fast hauls the MISSISSIPPI WAGON is a "natural" money-maker because no part of the weight of the loaded trailer is carried on the tractor at these high speeds.

BUT ADEQUATE WEIGHT IS TRANSFERRED AT THE WILL OF THE OPERATOR TO SECURE MAXIMUM TRACTION IN LOW OR SECOND GEARS.

In figuring your bid a low figure can be set up as a reserve for repairs.

HERE IS WHY

AT LIST PRICES EVERY GEAR, BEARING, AND SHAFT, IN THE FIVE-SPEED TRANSMISSION OF THE MISSISSIPPI WAGON TRACTOR UNIT COSTS ONLY $195.54

EVERY WEARING PART IN THE REAR AXLE & DIFFERENTIAL COSTS ONLY $172.33

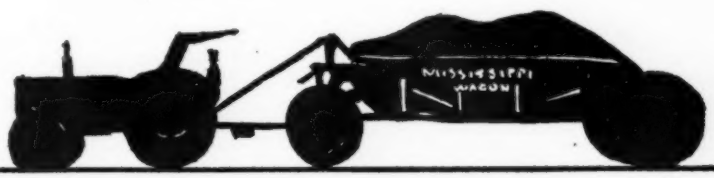
Prices and other repair items of the MISSISSIPPI WAGON are proportionately low in cost.

Post war competition will be tough, but not for the owner of the world's most modern hauling equipment—

THE MISSISSIPPI WAGON

★ ★ ★

Contact your nearest International Industrial Power Distributor for the complete facts about the MISSISSIPPI WAGON. He will tell you which of the three models are best suited for your particular needs.

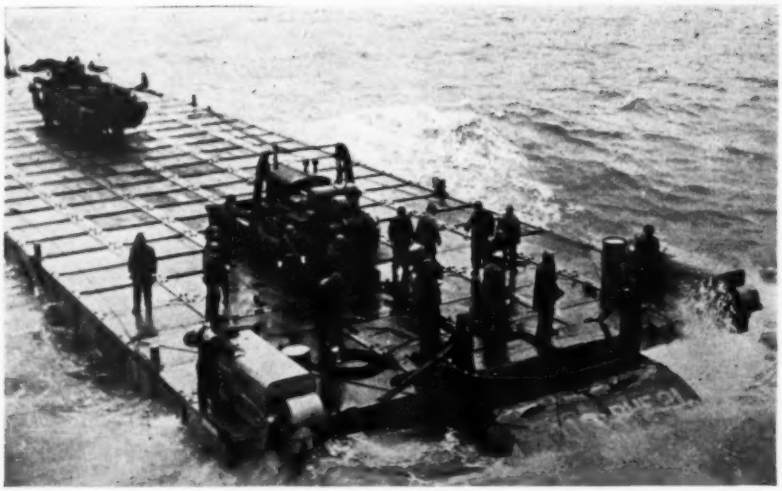


M-R-S

Manufacturing Co.

JACKSON, MISSISSIPPI

• Overhead view of a "Rhino Ferry" underway, powered by its outboard motors and carrying an armored car and Baker bulldozer and Allis-Chalmers tractor to the French coast.
Official U. S. Navy Photograph



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Simplex
LEVER · SCREW · HYDRAULIC
Jacks
for every construction purpose
Awarded the Gold Medal for Safety
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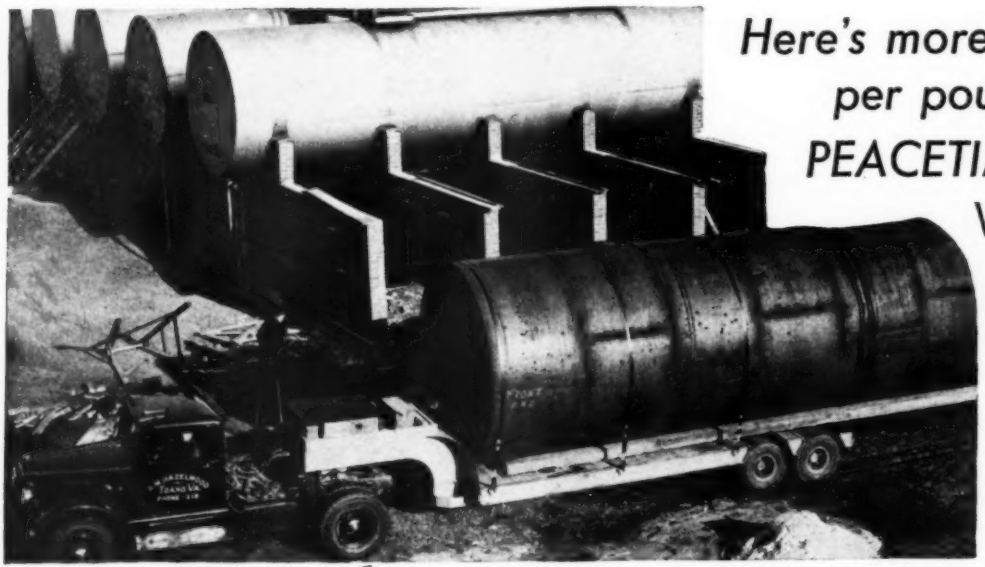
linois. Shipments, however, are made into all states east of the Mississippi except some of the New England states outside the economic range of sources of supply. Shipments of slag are made by railroad, truck, and waterway.

The average shipping range of blast furnace slag in 1943 was 57 miles by rail, 14 by truck, and 157 by waterway. In most instances shipments did not exceed 100 miles by railroad, 30 by truck, and 280 by waterway.

During the process of crushing and screening blast furnace slag particles of metallic iron which escape through the slag notch of the blast furnace are recovered at the slag plant by means of hand-picking and magnetic pulleys. During 1943 the companies surveyed reported 154,207 tons of metallic iron recovered and returned to the furnaces to bolster the supply of metal so vitally needed in the prosecution of the war. The yield is slightly in excess of 1.1 per cent or approximately 23 pounds of metallic iron per short ton of slag processed.

Not including those assigned to ad-



Here's more payload per pound of PEACETIME AND WARTIME TRAILERS

ANY AXLE OR WHEEL COMBINATION

JAHN Heavy Duty TRAILERS
Capacities from 5 to 100 TONS

JAHN TRAILERS have earned their reputation of more payload per pound of trailer because of the many mechanical construction features which insure maximum strength, rigidity, smoothness of operation and long life. Frames are welded, deep, wide flange, main beams with substantial cross members and outriggers. Inproved "goose neck" construction, spindles of special heat-treated alloy steel, and heavy cast wheels are of ample size to stand up under heavy road shocks and occasional overloads. Radius rods, brake cross-shafts, and all other points requiring lubrication are fitted with bronze bushings. Multiple oscillating or tandem rear axles assure equal distribution of weight over all tires even when passing over the roughest ground. Every detail is fabricated with extreme care and skill. No Jahn Trailer has ever failed from carrying its rated capacity load. Jahn Trailers can be quickly converted to semi-trailers by disconnecting king pin lock and removing front dolly. For all heavy-duty trailer problems—Come to "Trailer Headquarters."

"Come to Trailer Headquarters" C. R. JAHN COMPANY, 1349 W. 37th Place, Chicago 9, Illinois

HIGH-SPEED *TOURNAPULLS* SAVE

INDUSTRIAL PLANT FROM RISING FLOOD WATERS

Fast-moving Tournapulls throw-up emergency levee to keep Illinois River water from stopping war production at R. G. LeTourneau, Inc., Peoria Plant. River raised 12 feet above average stage. Notice depth of water. Railroad tracks remain dry—shipments can continue.

Build 3,000 Feet of Levee, an Average of 5 Feet High and 20 Feet Wide in 489 Machine Hours

The ability of rubber-tired Tournapulls to haul dirt fast over paved city streets and wet, rutted haul roads enabled R. G. LeTourneau, Inc. to fight the Illinois River to a standstill during a recent flood threat. These powerful dirtmovers hauled 9846 cu. yds. of clay and loam over an 8,000-foot one-way haul in 489 machine hours . . . kept the emergency levee at an average of 2 feet above the rapidly raising waters.

Without Tournapulls, this emergency dirtmoving job would have been impossible. The haul route included: city streets, four railroad crossings, a state highway, grades from 3 to 10%—and a considerable section of the soft top of the emergency levee.

Rubber-Tired Power the Answer

The large pneumatic tires on the Tournapulls not only allowed travel over paved surfaces but also gave ample flotation on the almost impassable levee roads—same time aided compaction on the levee. Plenty of excess power and rimpull for Tournapull weight permitted top speeds up to 14.9 m.p.h. on parts of the haul . . . also enabled the rigs to handle the adverse grades and to pull through the muddy spots.

COMPARE WITH OTHER METHODS

Problem: To move 9,846 cu. yds. over 8,000-foot one-way haul for emergency levee.

EQUIPMENT	Tournapulls Model Super C with 11-Yard Carryall	Tractors 90 H.P. Model with 11-Yard Scraper	Shovel 1¾-Yard Model 18—4-Yard Trucks
MACHINE HOURS REQUIRED	Actual Performance 489	Estimated Performance 1315	Estimated Performance 608

NOTE: { Performance based on 40 minute hour or 66⅔% efficiency because of delays on haul route waiting for traffic at state highway, trains at railroad crossings and normal traffic flow of trucks and trains from shipping department.

High-speed, rubber-tired Tournapulls built this 3,000-foot levee in 45.5 hours with an average use of 11 rigs. With tractor-drawn equipment it would have taken 29 units to do the same job in an equal amount of time. The truck and shovel time could not be improved by adding units as 18 is the maximum for cycle loading on 8,000-foot one-way haul.

Ask About TOURNAPULLS for Your Jobs

For lowest-cost postwar earthmoving, plan to use the rubber-tired power of Tournapulls. More than 1,800 are now in use. For detailed information on Tournapulls, write TODAY for the new 8-page informative booklet—"The Trend to Rubber-Tired Power". Address: R. G. LeTourneau, Inc., Dept. EE-844, Peoria, Illinois.

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

Large Tournapull and Carryall tires made hauling over paved streets possible. On 16,000-foot round trip, Tournapulls turned 10 corners, crossed 4 railroad tracks and a state highway.

Tournapulls were required to end-dump on one part of the levee. These earthmovers had plenty of power and maneuverability to back over the 9 loose yards. This eliminated much Dozer work; dirt could be placed near end of narrow levee.

275 feet of sandbag levee connects two sections of the dirt levee. Over 8,000 man hours were used to build this sandbag section—only 700 man hours for the 3,000-foot dirt levee.

TOURNAPULLS • RUBBER-TIRED POWER FOR FASTER EARTHMOVING

• Seabees use Caterpillar tractor and LeTourneau bulldozer to fill in Jap tank trap and cover barbed wire entanglements at Tarawa.

U. S. Marine Corps Photo

ministrative, office, and sales activities, 1550 plant and yard employees were engaged in the production of commercial slag in 1943. The total number of man-hours in production was 4,194,496.

Claim 3,000 Additional Airports Needed After War

Three thousand additional airports will be needed throughout the country after the war to keep abreast of the expected advances in aviation, William L. Anderson, executive director of the Pennsylvania Aeronautics Commission, declared recently in Philadelphia in an address before the Pennsylvania State Association of Boroughs.

Terming lack of landing fields the bottleneck of aviation, Anderson estimated that at least 139 additional airports will be needed in Pennsylvania and that as many as 35 will be required in the Philadelphia area alone.

New Orleans Toll Tunnel Or Toll Bridge Proposed

By R. P. DAY

Two moves for major access projects to New Orleans, providing for construction to be delayed until the war is over, took form recently in the Louisiana State Legislature at Baton Rouge. The planning is about the most ambitious piece of legislation introduced for new construction since the days of Huey Long.

The first proposal, introduced by Senator William J. Gruber of New Orleans would create the Mississippi Transit Commission of seven members, all appointed by the governor. Authorized to issue up to $40,000,000 in bonds, the Commission would earmark the money for either a toll tunnel or a toll bridge across the Mississippi at New Orleans, depending on which is the more feasible. The bonds would be retired under the Gruber plan by tunnel toll fees, and when the total issue had thus been amortized the structure would revert to the state and be used thereafter as a free transit artery across the river.

Another proposal, not yet formally drafted, would add $1 to the auto license tag fee in the six parishes bordering Lake Ponchartrain—Orleans, Jefferson, St. Charles, Tangipahoa and St. Tammany. This additional money would be funded into bonds, which would be used to finance a solid causeway from Mandeville to West End, with two short bridges set along the structure. The author of this proposal is Rep. Fred J. Heintz of Covington.

The Gruber proposal has been thoroughly planned and is the most definite earthmoving job to be worked out for the postwar period in Louisiana. A tunnel under the Mississippi River would rival in engineering difficulties the problems found in tunnelling under the Hudson. Under the terms of the proposal, all construction would be done under the direct supervision of the Louisiana State Highway Commission.

Grader Shipments Are Up 28% in First Quarter

Over 1200 graders of all types were shipped in the first quarter of 1944 or approximately 28 per cent more than were shipped in the corresponding quarter of 1943. Compared with the last three quarters of 1943 when shipments maintained a stable level of about 1450 per quarter, the first quarter shipments represent a decrease of about 15 per cent. At the end of the first quarter, 1944, there were unfilled orders for

(Continued on page 436)

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Balanced Performance
LET THE Red Strand BE Your GUIDE
☆ PREFORMED or Non-Preformed . . . Round Strand or Flattened Strand . . . hemp center or wire rope center . . . whatever your needs, there is a "HERCULES" (Red-Strand) Wire Rope that will give you longer service.
That is because the five essentials — strength . . . elasticity . . . flexibility . . . toughness . . . durability are built into "HERCULES" (Red-Strand) Wire Rope in perfect balance.
For balanced wire rope performance you can rely on "HERCULES". For real wire rope economy, let the RED-STRAND be your guide.
HERCULES RED-STRAND WIRE ROPE Round Strand 1886
HERCULES RED-STRAND WIRE ROPE Flattened Strand 1893
HERCULES RED-STRAND WIRE ROPE Preformed 1934
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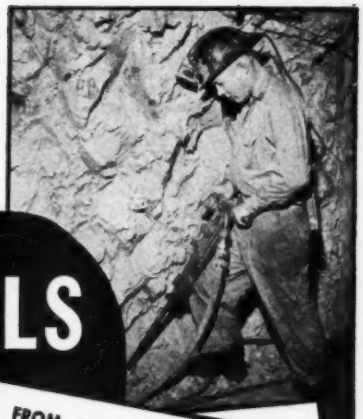

Thor ROCK DRILLS

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CONTRACTORS ARE *SOLD* ON THESE THOR PERFORMANCE AND MAINTENANCE FEATURES

● LOW AIR CONSUMPTION

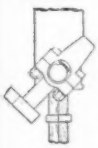
Thor Positive Short-Travel Tubular Valve uses effectively every ounce of air that enters the machine - - - measures air to a tolerance of .00025 of an inch!

● STEADY, FAST DRILLING

Extra-powerful rotation through extra sturdy rifle bar assembly and positive, non-slip ratchet action prevents stalling, even in heavy, sticky formations . . . full air power behind the piston gives the steel maximum forward and rotating power.

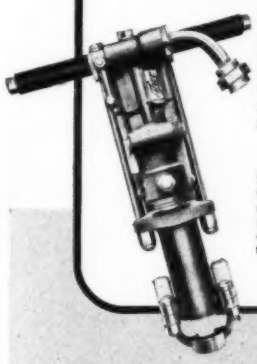
● AUTOMATIC LUBRICATION

On each reciprocation of the Thor piston hammer, oil is forced under pressure through a felt filter pad to keep every part of the machine constantly lubricated.



● OPERATING EASE

The Thor four-position throttle gives the operator complete control of drilling speeds for all operating conditions. Exclusive Thor spring retainer design provides quick, easy removal of the steel—provides longer life with fully enclosed springs that cannot clog or be over-tightened.



● POWERFUL HOLE-BLOWING

Thor air economy in turning every foot of air into power combines with powerful rotation to provide steady, maximum hole-cleaning ability.

Send today for complete information about Thor's wide range of light and heavy duty sinker, drifter and stoper rock drills and associated contractors' tools in Catalog 42-A.

FROM A MAMMOTH PENNSYLVANIA TUNNEL JOB*

"Thor Rock Drill was put through rugged stripping tests and outdrilled everything on the job, showing exceptionally powerful hole-blowing capacity by holding to steady drilling despite hitting three inches of clay every three or four feet."

FROM AN ARIZONA DEVELOPMENT*

"Thor Rock Drill used in five different veins of varied texture and hardness showed such excellent results that runners took it apart to admire fine construction."

FROM A COLORADO CONTRACTOR*

"Thor Rock Drill drilled as deep as 25 feet in clay streaked conglomerate rock with amazing hole-cleaning power...out-drilled every other tool on every operation."

Straight from the work come these reports of Thor Rock Drills *out-drilling everything on the job* in all types of underground and surface hard-rock operations.

On-the-job tests like these are making Thor Rock Drills the popular choice of contractors everywhere who *know* Thor performance . . . who *know* the low maintenance, smoother, faster handling made possible by Thor design and construction.

*Name furnished on request.

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United States Senate

COMMITTEE ON
POST OFFICES AND POST ROADS

March 22, 1944

Mr. C. W. Brown, President
American Road Builders' Association
1319 F. Street, N. W.
Washington, D. C.

My dear Mr. Brown:

The report, "A Sound Plan for Postwar Roads and Jobs," prepared and submitted by the American Road Builders' Association, has been of great value to my Highways Sub-Committee of the Special Senate Committee on Postwar Economic Policy and Planning, and has now been printed for the use of the entire Committee.

As you know, this Committee, commonly known as the George Committee, must consider all phases of the postwar problem. Therefore, a careful study must be made of everything that has to do with production, employment, government activities and the national economy. Your report has been and will be one of our important references, not only because of its summation of highway needs, but also by reason of its consideration of the major economic factors affecting our national prosperity. Containing, as it does, answers to many vital postwar planning questions, every person concerned with the postwar problem should read and study it.

The American Road Builders' Association and the author of the report, Engineer-Director Charles M. Upham, merit the highest praise for this worthwhile contribution.

Yours very sincerely,

Carl Hayden

United States Senator
From Arizona

THIS ADVERTISEMENT CONTRIBUTED TO
STIMULATE POSTWAR PREPAREDNESS

READ AND STUDY IT!"

Says U. S. Senator Carl Hayden, Chairman, Highway's Sub-Committee

When a Senator writes to urge everyone to get interested—that's news.

Senator Carl Hayden's letter reproduced on the facing page shows two healthy signs. It indicates that legislators appreciate the thoughts of the public on important matters. It also indicates that Senator Hayden and his Highway's Sub-Committee are on the job and looking ahead. This is indeed fortunate.

Every man, woman and child has an interest in the postwar highway building program. Good roads are a necessity, bringing countless benefits and savings to all. As a matter of fact, the economic structure of our country is built around the motor vehicle.

Many postwar plans will come before Congress. But that of the American Road Builders' Association is the first sound plan up for consideration which so greatly affects the prosperity of all without imposing a drain on the national economy.

The proposed highway program calls for an inter-regional system worked out by the American Association of State Highway Officials. Covering 34,000 miles, it will afford jobs for three million persons quickly. According to the U. S. Public Roads Administration, the three billion dollar annual budget proposed for it will eventually result in nine and one-half billion dollars in business transactions. Taxes and fees now levied for highways and streets, if used for the purpose, would eventually build and maintain the system.

What happens to the postwar highway building program will set a pattern, good or bad, under which private enterprise will function freely or otherwise.

Besides detailing a planned, plausible, postwar program, the book, "A Sound Plan", gives deep but comprehensive consideration to the major economic factors affecting our postwar prosperity. Read this book and we feel sure it will win your active support.

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for Postwar
ROADS... and JOBS
Based on studies of prosperous periods and depressions, this plan provides for full employment, better transportation, and active markets, the essentials for a prosperous future.
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LINN HAFTRAKS with contour-following traction, did the tough work in carving out this airport. . . . . .

The LINN CONTOUR-FOLLOWING TRACTION Manufacturing Corp.
Morris, New York

Shots from the Firing Line

(Continued from page 432)

4855 graders, thus continuing the high level of unfilled orders maintained during 1943.

Of the three types of graders, motor grader, elevating grader and blade grader, the motor grader accounts for approximately two-thirds of total grader production.

Data for 1942 to date are based on reports received from eight companies representing neafly 100 per cent of the industry. Annual data on shipments for the years 1937 to 1941 are based on reports from nine companies also representing the entire industry.

(Number of Graders)

Year and Quarter	Shipments	Unfilled Orders (End of Quar.)
1937—Total	7568 r	—
1938—Total	5808	—
1939—Total	5585 r	—
1940—Total	6199	—
1941—Total	7559 r	—
1943—Total	5324 r	—
1942—4th	640	2882 r
1943—1st	959 r	4402 r
2nd	1450	3897 r
3rd	1458 r	4965 r
4th	1457 r	4801 r
1944—1st	1233	4855

r—revised

Approve Report for Uniform State Motor Vehicle Laws

The American Association of Motor Vehicle Administrators, at its annual meeting in Chicago, June 20-23, approved a report calling for uniform state laws regulating highway transportation and voted to assume full responsibility of leadership in seeking remedial legislation. The action originated in a report of the Reciprocity Committee of the AAMVA (approved without a dissenting vote in the final session) calling for the drafting of recommended uniform laws relating to motor vehicle reciprocity and size and weight regulations.

RAPID DUMPING FOR HI-SPEED

In digging and material handling, too, rapid discharge of the load is an essential feature. Every Owen Bucket is designed to incorporate rapid discharge operation—a factor responsible for their outstanding performance.

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BRANCHES: New York, Philadelphia, Chicago, Berkeley, Cal.

OWEN BUCKETS
A MOUTHFUL AT EVERY BITE

● Excavating intake structure of diversion dam.

Pacific Gas . . .

(Continued from page 418)

obtain suitable construction equipment and the necessary parts for proper maintenance and repairs.

Work started at Adits Nos. One and Two in the summer of 1941 before the construction power lines were built. At Adit One portable gas engine compressors were used for drilling and to supply an air-operated mucking machine. Later, when power lines had reached this point, electric power for the mucking machines was taken into the tunnel at 2,300 volts by means of armored cable. This voltage was stepped down to 440 volts by portable transformer banks that were moved along the tunnel at approximately 1,500-foot steps as driving progressed. Lighting was supplied in the tunnel by a three-wire 220-volt system. Blasting was done from a separate blasting line.

● Mucking machine at Adit 3.

Excavation at all headings was performed by 75 h.p. Conway mucking machines. The mucking machines loaded material into 36-inch gauge side-dump cars holding five and six cubic yards. Trains of four to six of these cars were hauled by storage battery locomotives on short hauls to the dump. For long hauls, the storage battery locomotives hauled the cars to the portal where gas engine locomotives took over.

Ventilation inside the tunnel was provided by Root Displacement Blowers which could either blow or suck air through 20-inch clip joint pipe. Compressed air for the three-inch Gardner Denver Automatic Lyner drills was supplied through 6-inch Spiweld and standard casing, either welded or equipped with Dresser-type couplings.

Only a small amount of water was encountered although Tunnel Sections One and Two were quite wet. Any water flow that did occur was handled easily by an eight-inch drain pipe.

Wall plate and top-heading drift methods were employed in Tunnel One and a section of Tunnel Two. Where lava slides were encountered, spiling was driven continuously to advance the drifts. At Adits One, Two and Three, 12 x 12 timbers were used, varying from a five-foot maximum spacing to solid timbering in the heaviest ground. When additional support was needed, gunite was shot between the timbers to stabilize the ground. This method satisfactorily held several thousand feet of tunnel for a period of two years before final concrete lining was placed.

After driving 27,000 feet down stream from Adit Two by the foregoing method the ground formations permitted full-face driving. A drilling jumbo carrying from six to nine Lyner drills was then used with a consequent acceleration in speed. In Tunnels One and Two progress in driving increased from six and one-half to seven and one-half feet daily to 20 feet daily.

Open Conduit

Driving was slowed down drastically in Adits One and Two by formations of lava slide and breccia. In the interests of speed, the tunnel was brought into the open 2,000 feet down stream from Adit One and a large rolled earth-fill embankment was constructed on the river's downhill side to form an open conduit. This conduit divided the tunnel into two parts. The embankment forming one side of the open conduit is 2,900 feet long and 60 feet high and averages more than 300 feet at its base. A 56'-wide spillway and flume leading to the river was built into this conduit.

The bank of the open conduit con-

tains 766,000 cubic yards of material most of it consisting of compacted earth borrowed from adjacent hill slopes. Four 2½ and 3-cu. yd. capacity power shovels were used in excavating the material for the earth-fill bank. Hauling was accomplished by Sterling and Euclid hauling units ranging in capacity from 14 to 17 cubic yards. The embankment was formed by spreading this material in layers from six inches to a foot in the thickness and then compacting it with sheepsfoot rollers.

There were two important construction problems involved in building the open conduit. One had to do with the necessity of obtaining a proper mix of the borrowed materials for the desired moisture content and density. The other problem was the matter of maintenance and repairs in keeping the shovel equipment operating. At that time repair parts were difficult to obtain because of priority procedure. It was necessary to maintain four shovels at the job in order to be reasonably sure that three shovels would be operating.

Surge Chamber

The surge chamber is situated at the tunnel outlet over the powerhouse. It is a concrete differential-type structure 96' deep and 90' in diameter. Its construction involved excavating about 40,000 cubic yards of material.

Excavation was started by using a bulldozer to remove 27,000 cubic yards above the top of the basin. Then a power shovel excavated the upper section and loaded the material into dump trucks. A ramp was built in a notch cut into one side of the basin as a truck exit. When excavation had reached a point 30 feet deep, the shovel was removed because trucks could no longer use the ramp. A clamshell and a small bulldozer were then used to complete the excavation.

Penstock System

. There are four steel penstocks leading from the tunnel to the powerhouse. Each penstock is 1,380 feet long and tapers from nine feet diameter at the tunnel to seven and one-half feet at the powerhouse.

Grading for the penstocks called for the excavation of 19,000 cubic yards of earth and boulders. This work was done by bulldozers except in steep sections that necessitated the use of power shovels. An additional 2,000 cubic yards were excavated by hand for the penstock piers.

Powerhouse

The building which houses the generating equipment is a steel frame concrete structure 266' long by 56' wide and 100' high. It is situated on the south bank of the river. Construction of the powerhouse building called for the removal of 93,000 cubic yards of material, by power shovels on the upper levels and by a 2½-cu. yd. dragline on the lower levels, and dump trucks.

A huge wedge of approximately 50,000 cubic yards of material was excavated from the hillside in order to clear the powerhouse site and provide a level foundation on the stream bank. Excavation began at anchor four of the penstock system and extended to the powerhouse site level 100 feet below. A power shovel and dump trucks were used in excavating the wedgeshaped cavity in the hill. Later the excavation was extended 55 feet below the powerhouse yard level and 30 feet below stream flow by means of a 2½-cu. yd. dragline.

The powerhouse excavation was protected from overflow by means of a low levee constructed along the left bank of the stream, with earth from the hillside. This earth was spread in layers and compacted by the trucks hauling equipment. The levee also served as a roadway over which supplies were hauled and cranes were moved while handling forms, reinforcing steel and pouring concrete.

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Beco Blocks and Linings take the heavy loads at the increased speeds demanded of modern excavating equipment. These Beco products are durable and tough — that's why replacements and adjustments are less frequent.

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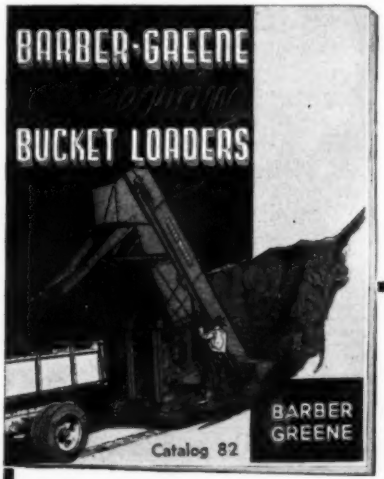

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Q-82

34 JOB PHOTOGRAPHS

The new Barber-Greene Bucket Loader Catalog 82 shows 34 photos of B-G Loaders saving time and money on different types of work including: truck loading from stock piles, road shoulder cleanup, top soil stripping, reclaiming, screening, loading scarified base, etc. Also specifications and accessories. Write for your copy.

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AURORA ILLINOIS

FIFTEEN NORTHWESTS for PETER KIEWIT Sons' Company Omaha, Nebraska

Here's one of those dirt jobs we've been talking about—and here's one of the many well known contractors that gets things done and buys Northwests again and again for results, because he knows that if you have a real Rock Shovel, you are equipped for output in any kind of digging.

Fifteen Northwests—fourteen repeat orders is a lot of testimonial to service, particularly when the service includes practically every type of work from the ordinary road job to the Iron Range.

Concerns like Peter Kiewit Sons don't make mistakes in buying machinery, and a shovel that will make money for them will make money for you.

NORTHWEST ENGINEERING CO., 1727 Steger Bldg., 28 E. Jackson Blvd., Chicago 4, Ill.

—When you have a real Rock Shovel the output in dirt is always high!

Dredge 'Quincy'

(Continued from page 413)

30" long 18-ply rubber sleeves made by Goodrich. The sleeves are joined to the pipe with steel clamps and a safety cable is attached to each of the clamps and run above the sleeve. Old pipe, a lot of it second hand material, is used for the shore line which is made up of pipe lengths of 30' and 60'. These pipe lengths on the shore line are joined by steel bands held to the pipes by wooden wedges driven between the bands and the pipes. The discharge pipe is used as a ground line for electric welding done on the dredge and so the shore line pipe lengths are connected with copper cable to complete the circuit. The safety cable automatically completes the circuit on the pontoon line.

The pontoons are made of wood and are 15'x9' and are 32" deep and have a 6'x6' superstructure. Three of these pontoons are used to float each 60-foot length of pipe and the unit of three is also called a pontoon. The overhead power cable can be disconnected at each unit of three and thus the pontoon line can be shortened and lengthened at will without cutting and re-connecting this cable. About each second unit of the pontoon line is anchored with wire rope run to log buoys held in position with mushroom anchors. The two pontoons carrying the angle pipe in the floating line are made of steel construction and have no overhead structure.

To prevent choke-ups in the discharge line when the suction head buries itself into the clay bottom of the lake, two emergency valves are connected into the pipe line. These valves are U-shaped pieces of pipe screwed into the top of the discharge line pipe and they have a floating rubber disk that is held up against the U-connection of the pipe when the pressure is up in the line. When the suction head buries itself into the bottom of the lake clay, the vacuum rises over 30 and the pressure falls on the other end of the main pump impeller and the rubber disk falls down and allows air to enter the line. If it were not for these safety valves there would be the danger of the rubber sleeve connection bursting when a choke-up occurs.

A derrick scow, which is anchored out in the lake near the pontoon line, is used for raising anchors on pontoon lines and on dredge swing lines and for hauling coal for heating purposes to the dredge in winter. A 38'-long work tug with an 8' beam, powered by two 100 h.p. motors, a Hudson and a Gray marine motor, with twin screws is used for hauling the derrick scow, for picking up supplies brought to the coal-loading dock by either boat or rail, for repairing the pontoon line, and other general utility purposes.

Shore Plant

The site of the shore plant was selected to permit easy dredging out of a basin which would serve as a storage pool for incoming sand and also to provide the shortest distance possible to convey the material dredged by the "Quincy" to the regrinding plant. The main dredge pump of this shore plant is a 12" Morris centrifugal pump with its suction pipe carried on a radial bridge pivoted just outside of the plant structure on a circumferential steel rail having a radius of 35 feet. The bridge of this plant dredge extends another 20 feet beyond the rail and the suction line has a vertical leg 35 feet long so that the storage pool consists approximately of a circular basin of about 270° with a radial dimension of 55 feet. The storage capacity of this pool is ample for about 72 hours of regrinding plant operation. When it is necessary for the "Quincy" to shut down for minor repairs, care is taken to see that the storage pool is filled to capacity before pumping is stopped.

The discharge pipe from the shore plant pump empties into a distributing basin which feeds the sand, controlled by gates, onto a 3/8" mesh screen to eliminate coarse rubbish. Material that passes through this screen goes to a triple-belt drag classifier and the resulting sand discharge drops onto a 24-inch conveyor belt equipped with an automatic recording scale. No record of the pumping, except the vacuum and pressure range which is recorded on a Crosby recorder, is kept on the "Quincy." Output figures of the dredge are the dry

Handle More Yards per $

Over long spans—100 to 1000 ft. or more—a Sauerman Power Scraper will dig and haul a large yardage fast and cheaply. Operation is an easy one-man job and maintenance expense is small.

Picture at left shows a mobile Sauerman scraper machine equipped with a 4 cu. yd. Crescent bucket digging a basin 350 ft. wide, one-quarter mile long, loading 200 cu. yd. an hour into trucks.

For illustrations and details of hundreds of material-handling jobs handled at low cost by Sauerman machines, write for Catalog 19.

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on ROGERS TRAILERS

GETTING there "fustest with the mostest" as one early American General aptly phrased it, is battle strategy that really conquers!

In the lightning speed of mechanized warfare tanks ride "Pick-A-Back" to battle on ROGERS TRAILERS so their fighting capacity is unimpaired. Special ROGERS TRAILERS retreive disabled tanks so they can be repaired and rushed into battle again.

EXPERIENCE *builds 'em*
PERFORMANCE *sells 'em*

ROGERS TRAILERS are doing a real war job at home and abroad. New models which will be available to industry when war contracts are completed will be even better-engineered and more efficient than their predecessors.

ROGERS BROS. CORPORATION
ALBION,
PENNA.

This Army Life sure builds you up!
TIGER BRAND has earned its service stripes
OUR ships, planes and mechanized fighting equipment have shown the world what American ingenuity can do when put to the test.
Wire rope, indispensable in the construction and operation of these implements of war, has taken on one unusual assignment after the other. Particularly is this true of American TIGER BRAND.
Not only have our engineers provided the fighting forces with TIGER BRAND to meet exacting requirements, but our shop forces, working around the clock, have turned out wire rope in quantities that would ordinarily have been thought impossible.
In making TIGER BRAND for war, we have learned two important things—how to turn out high quality wire rope fast, from new and better steels—and how to adapt it successfully to many new uses.
This hard-earned knowledge will insure top efficiency when you apply TIGER BRAND in domestic service. Today, a steadily growing amount of TIGER BRAND is becoming available for use here at home. So, when you need wire rope—and want the best—give us a call.
Excellay Preformed
AMERICAN TIGER BRAND WIRE ROPE
AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York
COLUMBIA STEEL COMPANY
San Francisco
United States Steel Export Company, New York
USS
UNITED STATES STEEL

tonnage fed to the mill. This tonnage is about 150,000 tons a month on the average to date. Classifier undersize goes at about 35 mesh into a series of V-tanks and from these tanks the thickened plug product is pumped directly into the regrinding plant. The overflow goes back to the pool. The sand discharge from the conveyor belt drops into a storage or surge bin of sufficient size to take care of minor operation breaks up to that point. From this bin the control of the sand fed to the mills is by hand-operated slide gates.

The main structure of the shore plant has direct connections for incoming supplies and outgoing concentrates. It is the same building that housed regrinding machinery for Calumet & Hecla at Lake Linden before it was dismantled in sections and re-erected at Mason. Little new critical material went into this building and in general much of the equipment is used machinery.

Regrinding Mills

The mills used for regrinding are former Calumet & Hecla pebble mills. The size and strength of the driving gears and pinions were increased and the area of the trunnion bearings enlarged to convert these former pebble mills to ball mills. The shells, themselves, however, were the original Hardinge shells used at the Lake Linden plant. The possibility of using this second-hand material was one of the factors that appealed to both Quincy Mining Company and Metals Reserve and made the whole proposition of the operation doubly attractive. The six ball mills are each in a closed circuit with a 66" Atkins classifier.

A hydraulic discharge is inserted between the mill discharge and the classifier to avoid building up coarse copper in the circuit. The plug product goes to a Wilfley table and the table tailings are pumped back into the circuit. Overflow from two of the Atkins classifiers goes to a 44-foot long Forrester flotation machine. Six ball-mill units and three Atkins classifiers make up the original grinding and concentration sections of the plant.

The slimes classified out in the shore plant which do not require finer grinding are pumped directly to a series of V-tanks in the wings of the regrinding plant. They are thickened and pumped to a 35-foot Dorr Torq thickener to eliminate the variations in tonnage of the product which is very irregular because of the nature of the operation. The thickened product is pumped to a six-cell Fahrenwald flotation machine by a diaphragm pump. Concentrates from the Forrester flotation machine and those from the six-cell Fahrenwald are further concentrated in a four-cell Fahrenwald and the tailings from this latter machine are re-circulated to the six-cell machine.

Concentrates from the Fahrenwald machine and from the Wilfley tables treating the plug product of the closed circuit system, are pumped to a dewatering tank and are fed to an 8'x3' Dorrco filter by a drag conveyor. The product is dewatered by the Dorrco filter. The drag overflow goes to a 25-foot Dorr thickener and the thickened product then joins the drag product at the filter. The filter discharges into 50-ton railroad cars for transportation to the smelter.

Oxidized Copper

Following the standard practice of the district, xanthate and pine oil are the only chemicals used in flotation. The sands contain a certain amount of oxidized copper which may become proportionately greater as the dredge gets into the richer, nearshore deposits. Up to the present, little difficulty has been experienced from the oxidized copper and there has been no need for suplhadizing chemicals. Due more to the irregularity in relative size of feed particles and the irregularity of the tonnage than to the oxidized copper present, recover is not as good as in the stamp mills.

Poorer recovery than at the stamp mills is a condition inherent in the nature of the operation, and there seems to be nothing that can be done about it since the deposit in place has areas of coarser and finer sand, a condition accentuated by the fact that the coarser material naturally deposits out closer to the dredge discharge and the finer particles float to more distant parts of the pool. At some times all of the material pumped is fines and at other times there are practically no fines so that there is very great fluctuation in the ball mill feed and also in the slime product going directly to the flotation machines.

Metallurgical results of the operation have not as yet been announced and it is too early to evaluate them outside of stating that the plant is operating at a profit to date, aside from the four cents a pound of copper for amortization. Inasmuch as the dredge is now located in the leanest area of the deposits surveyed and sampled, and since metallurgical results will probably improve to some extent through experience, it is a fair assumption that the Quincy Mining Company, sponsors of the operation, will make good.

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PORTABLE CONVEYORS
★ Cargo Conveyors for Industrial Use
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FOR WAR-TIME
LABOR SAVING
Flexible... Adaptable... Relatively Inexpensive... Conveyors as Haiss builds them are the logical answer where man-shortages make each workman's labor precious.... Haiss Portable Conveyors are engineered jobs, with loads carried on high-grade ball and roller bearings. Frames are truss-designed for strength without excess weight.
Essential Industry Inquiries and Orders given prompt attention. Write us.
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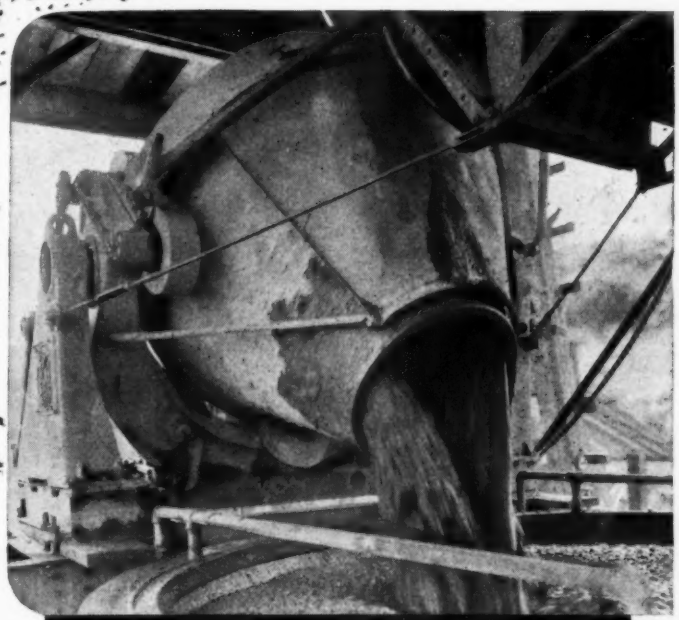

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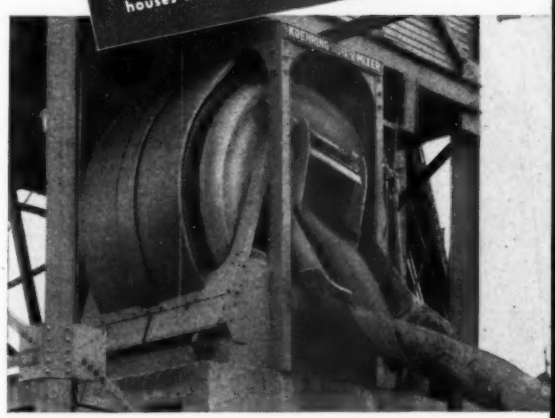

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Koehring Tilting and Non-Tilting Mixers have established pouring records on many large volume concrete jobs . . . dams, spillways, locks, bridges, power plants, drydocks, etc. for both peace and wartime projects. Koehring Construction Mixers have specially designed non-clogging drums and drum interiors to produce thoroughly mixed, quality concrete. They are substantially constructed to operate day and night continuously for maximum yardage production. *Plan now* for a Koehring Mixer for postwar construction. Consult our distributor or write to us for information.

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ARMY E NAVY

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HEAVY-DUTY CONSTRUCTION EQUIPMENT

NOT in the *Contract*

Farmer Jones took his pig to town and sold it. With the money he bought a suit, a hat, a pair of shoes. Then he tucked the bundle under the seat of his wagon and said, "Giddap, Dobbin, let's get home and surprise Miranda."

On his way home he stopped at the river, took off all his old clothes and threw them in and watched them sink. Then he looked under the seat for his new outfit. It was gone.

Back on the seat he climbed and said, "Giddap, Dobbin, we'll surprise her anyway."

Wrote Private Smith to his wife: "Don't send me any more nagging letters. I want to fight this war in peace."

With peroxide scarce blondes are having trouble holding established bleach-heads.

She was on her way home from a first aid course when she saw a man lying prone in the middle of the sidewalk. His face cradled on one arm; the other arm was twisted under him in a peculiar position. Without a moment's hesitation she got down on her knees and went to work.

"Lady," said the victim after a few moments, "I don't know what you're doing, but I wish you'd quit tickling me. I'm trying to hold a lantern for this fellow down in the manhole."

A negro boy, going through a cemetery, read this inscription on a tombstone: "Not dead, but sleeping." The lad scratched his head a while and remarked to himself: "He sho' ain't foolin' nobody but himself."

"My advice to you, is to go through the movements of driving without using the ball," said the golf instructor.

"That's precisely the trouble I'm trying to overcome!"

"One of our former employees heard of the manpower shortage and so he sent him to us from Australia."

An airplane crashed off the coast of Norway some months after the occupation. A fisherman hastened out in his boat on a rescue mission, but returned a short while later quite empty-handed. "Nazis" he explained tersely.

"But weren't they alive?" he was asked.

"One of them said he was," admitted the Norwegian. "But you know how those Nazis lie."

Two drillers sat down to eat their lunch. One began to unwrap a package some 18 inches long.

"What's that?" asked the other.

"My wife's away," said the first, "so I made myself a pie."

"A bit long, ain't it?" his friend asked.

"Long? Sure it's long. It's rhubarb."

"Madam, what do you mean by letting your child snatch off my wig?"

"Oh, it's a wig, is it? I was afeared for a minute that he'd scalpt ye."

Mother: "Sally, you certainly took long enough to say good night to that young man."

Sally: "Well, Mom, when a young man takes a girl to the movies, the least she can do is let him kiss her good night."

Mother: "But daughter, I thought he took you to a night club this evening."

Sally: "He did."

A housewife opened her refrigerator and found a little rabbit sitting inside. "What in the world are you doing in my refrigerator?" she asked. The rabbit peeped out and then craned its neck to catch a glimpse of the name plate on the icebox. "This is a Westinghouse isn't it?" he asked. "Yes, it is," she replied, "but what are you doing in it?" "I'm just westing," the bunny replied.

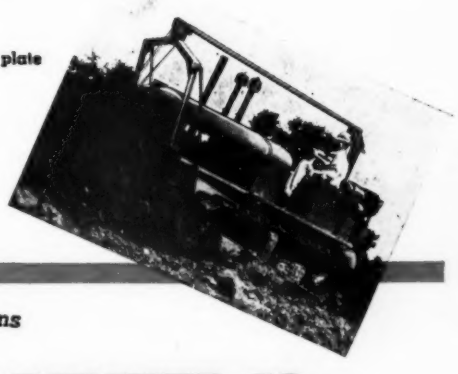
A man decided to go next door and borrow a lawn mower. Before he stepped off his porch he began to guess what his neighbor would say. "He probably won't give it to me," he growled. He went a few feet further. "The old skinflint has a lot of nerve refusing me his lawn mower." By the time he reached his neighbor's house he was burning up. When the neighbor opened his door the would-be borrower shouted indignantly: "To hell with you and your lawn mower!"

here's why the NEW Buckeye Dozer...

at all these features

- Rugged construction
- Simple design
- Moldboard reinforced horizontally and vertically
- Sturdy push frame
- Curved blade to roll bigger loads
- No useless excess weight
- Natural digging action
- Straight direct center lift of moldboard
- Replaceable corner bits
- Reversible cutting edge
- Double trunnion tilt
- Powerful lift
- Unlimited digging depth
- Split-second, fraction-of-an-inch, finger-tip cable control
- Low friction loss
- Minimum cable wear
- Blade hugs radiator
- Heavy, closely spaced push plate supporting ribs
- High lift
- Balanced design

The new Buckeye Center Lift Dozer has them all. It's the dozer that can stay on the job, leveling, grading, back-filling, uprooting trees, clearing underbrush — rolling bigger yardage loads with minimum lost time for repairs and maintenance.



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Findlay, Ohio

TO ADVERTISE: All advertising in this section is payable in advance. Rate: 60c per line, or $7.20 per inch of 12 lines. Minimum charge $2.40. No discounts; no commissions. If no change in copy is desired, three continuous insertions are offered for the price of two. Read these instructions carefully. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Count your own copy to save delay. Be sure to enclose the correct amount of money with your order. Closing date—15th of preceding month. Example: January issue closes December 15th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

FOR SALE

3—95-C Bucyrus Steam Shovels mounted on large traction wheels, 3½ yd. manganese dipper, all in really good operating condition. Also have plenty of spare parts available from two similar machines partially dismantled.
1—70-C Railroad type Bucyrus Steam Shovel, 2½ yd. dipper mounted on large traction wheels—in good operating condition. Also extra parts.
1—Monighan No. 4 Steam Dragline, 127 ft. boom, 3-yd. bucket, mounted on skids and rollers. Box 3058

FOR SALE

Used 50-B steam shovel; 80-B steam dragline; Class 14 steam dragline; all Caterpillar mounted and now operating. Box 3052

FOR SALE

Class 14 Bucyrus steam dragline shop No. 311, 65' boom, mounted on skids and rollers, boiler inspected 125 lbs. pressure year 1942. Located Eastern Nebraska. Priced reasonable. Box 3039

FOR SALE OR RENT

1—80-B Bucyrus steam shovel, Serial No. 4020, 45' Boom, 28' Stick, 2½ yard bucket. Good operating condition, location western Kentucky, will strip 22' overburden. Tel. 3-5581, P.O. Box 21, Montgomery 1, Alabama.

FOR SALE

Marion 250 Strip. Shovel, 5 yd. dipper, overhauled '44, inc. the boiler.
3 yd. Electric Walker Dragline.
2½ yd. Page Diesel Drag. on trucks.
2 yd. Page Diesel Walker Dragline.
No. 4 Wms. Jumbo Jr. Hammermill.
100 HP F-M Full Diesel Engine.
14' Grader, steel wheels, gas motor.
Jas. Wood, 53 W. Jackson, Chicago 4, Ill.

FOR SALE

Bucyrus-Erie 1¼-yd. gas-air shovel, rebuilt.
Davenport, Porter, Vulcan 17 to 20-ton steam 36" gauge S/T locomotives, (4), rebuilt.
Gas locomotives, 8 to 45 ton, 36"-56" ga.
Gyratory crushers, 10" to 27"; 7" Newhouse.
Sturtevant No. 2 rotary fine crusher.
Marion 4-yd. electric No. 4160 shovel, a.c.
Page Diesel 2-yd. Walker dragline, 65' boom.
Pioneer 300W portable gravel washing plant.
Diamond portable rock crushing plant, A-1.
Euclid 6-yd. bottom dump crawler wagons (8).
Bucyrus 80B steam crawler shovel, 45' boom.
Bucyrus-Erie 50B 2-yd. steam shovel.
Hydroelectric plant, 1000 HP, 60' head.
Bucyrus Monighan Walker Diesel 3W dragline.
Boiler tubes, 1¾" O.D. x 5', 12 ga., new.

H. Y. SMITH CO.
828 N. Broadway Milwaukee 2, Wis.

SURPLUS EQUIPMENT FOR SALE BY CONTRACTOR

3—Koehring Wheels, Model WHC8, Serial Nos. 1036, 37, 38. Equipped with General Motors Diesel engines.
1—RD8 Tractor, Serial No. 1H950, equipped with two drum power control unit and bulldozer.
For Sale as a Unit $24,000.00
1—"75" Caterpillar Diesel Tractor, Serial No. 2E641. Equipped with Bulldozer.
1—Caterpillar 48" Elevating Grader, Serial No. 4E117.
For Sale as a Unit $10,000.00
1—10S Rex Concrete Mixer, Serial No. 126634. Price $980.00
1—Paving Outfit, consisting of:
1 Rex 27E Paver, Serial No. 9530
1—Lakewood 20' Concrete Finishing Machine
1 Lakewood 20' Subgrader
1200 ft. of 7" Steel Forms
2000 ft. of 9" Steel Forms
For Sale as a Unit $6,500.00
1—Kohler 3KW Light Plant, used 60 days. Price $400.00
1—Bulldozer Attachment for No. 12 Auto Patrol Price $400.00
1—"60" Caterpillar Tractor, equipped with bulldozer. Price $1,000.00
4—Double Drum Sheepfoot Rollers Price ..... $500.00 each
1—2000 Gallon Semi-Trailer Tank $500.00
1—2400 Gallon Semi-Trailer Tank $700.00
1—Model "C" Allis-Chalmers Farm Tractor including plow attachment $600.00
1—Model "A" Allis-Chalmers Farm Tractor including plow attachment $975.00
1—Model "F" LeTourneau Carryall $4,500.00
1—"Standard" 4,000 Pound Asphalt Plant complete with dryer, boiler, dust collector, four 8,000 gal. storage tanks, Caterpillar D-17,000 power unit, and Jaeger laydown machine. This plant has processed only about 60,000 tons of material $40,000.00

All of these units have been reconditioned and are ready to go to work. Prices are F.O.B. present location and offer is subject to prior sale. Most of these units are located at 3525 North Four Street, Albuquerque, New Mexico; P.O. Box 1479 or telephone 9696.

FOR SALE

Excellent condition REX 34-E dual drum paver complete, serial No. GG149, which was bought new 3-16-44. Box 3056

LIQUIDATING CONTRACTOR'S PLANT

½ cu. yd. General Backhoe, Shovel and Crane. 105 Northwest Crane and Shovel Combination. Cleveland Backfiller. 2 Ton Crawler Cranes. 65 H.P. Economic Boiler 100 lb. Stock and Fittings (Coal). 18 H.P. Vertical Boiler 125 lb. Pressure, complete fittings (Oil). 2—8000 gal. Tanks—Coils. 5 Portable Compressors, Jack Hammers. R-4 Bulldozer. Sheeting Hammers. Air Hoist, 7 cu. ft. to 28 cu. ft. Gas, Electric and Steam Mixers. Jetting Pumps. Pipe line testing equipment. 2 drum electric hoist. 20 Ton, 10 Ton and 3 Ton Trailers. ¼ cu. yd. to 1½ Buckets, Excavating, Rehandling, Pulpwood, Grapple. Shovel Fronts for ¾ cu. yd. Koehring, ½ cu. yd. Lorain 35, 1 cu. yd. P&H 600. Byers Bearcat Crane—backhoe attachment. 5 Ton Gas Roller—10 Ton Steam. Welding Rods. 2—6 cu. yd. Watson Wagons. 25 Ton—30 Ton Std. Gauge Locomotives; 2—6 Ton 36" Gauge Gas; 2—12 Ton 36 Gauge Steam. Pipe Threading Machines 2" to 8". Complete Concrete Mast and Chuting Outfit. Hydraulic Jacks. Asphalt Heaters. Turnbuckles, Rope Blocks. Large Quantity All Weights Railroad switches, frogs, compromise joints, bumpers, Steel Sidewalk and Curb Forms. Large stock Parson trencher and Cotta transmission spare parts. ALL IN EXCELLENT CONDITION. Equipment Service, Box 75, Valley Stream, New York. Hollis 5-4315.

FOR SALE

Fairbanks-Morse Diesel Engine 210 HP, 360 RPM 6-cylinder, 10" x 12½" Model 44 HD10. Box 3057

FOR SALE

1—Shovel Front; 1—Back hoe attachment; complete, for Bucyrus-Erie 10-B Dual Rope Crowd Shovel. Available for immediate shipment, no priority. Located in Ga. Box 3048

FOR SALE

Welding and Cutting Outfits, Torches, Regulators and Gauges, for heavy, medium and light welding and cutting. Superior Oxy-Acetylene Co., Hamilton, Ohio.

FOR SALE

Electric Cat. Shovels—1¾, 2, 3 and 4 yd.
Shovel Front Parts and misc. for P&H 206.
Fairleads for L-B K-55; 20 HP gas motor.
Loco. Cranes 15-27½ tons, gas-Diesel, stm.
Barber-Greene 44-C Trencher, 8'3" boom.
16 Yd. Air Dump Cars, Standard gauge.
TD-40 Angledozer; Cat. 50 Bulldozer.
150 HP Sauerman Electric Slackline.
850 KW Uniflow gen. unit, AC, 200 lbs.
¾ yd. rehandler Clam. $300.; ⅝ Owen.
Jas. Wood, 53 W. Jackson, Chicago 4, Ill.

SURPLUS DIPPERS FOR BUCYRUS-ERIE SHOVELS

3—⅝ cu. yd. Skipper Scoop Dipper—10-B
2—½ cu. yd. Dragshovel Dipper—17-B
3—½ cu. yd. Skimmer Scoop Dipper—17-B
1—⅝ cu. yd. Inserted Type Dipper—16-B
1—¾ cu. yd. Welded Dipper—21-B
1—1 cu. yd. Dragshovel Dipper—29-B
1—1¼ cu. yd. Cast Front Dipper—GA-3
1—1¼ cu. yd. Inserted Type Dipper—30-B, 42-B, 41-B, 43-B, and E-2.
1—1½ cu. yd. Heavy Duty All Cast Dipper—42-B
1—1½ cu. yd. Snow Loading Dipper—10-B
1—2 cu. yd. Rock Dipper—75-B
1—2¼ cu. yd. Inserted Type Dipper—50-B
1—2¼ cu. yd. Inserted Type—55-B
1—2¼ cu. yd. Welded Dipper—48-B
1—2¼ cu. yd. Rock Dipper—75-B
1—2½ cu. yd. All Cast Dipper—55-B
1—2¾ cu. yd. Light Duty Shovel Dipper—54-B
1—3½ cu. yd. Coal Loading Dipper—75-B
1—4 cu. yd. Type IV Med. Duty Dipper—100-B

F.O.B. Works

Write for any further information desired.

BUCYRUS-ERIE COMPANY
Parts Department
South Milwaukee Wisconsin

FOR SALE

Diesel shovel equipment, complete set for 50-B. Includes 2-yd. dipper, boom, dipper handle, crowd machinery, two sets teeth. Good condition. Located in Kentucky. $2400 f.o.b. Box 3040

FOR SALE

16 ton Vulcan 36" gauge gas locomotive
22½ ton rebuilt locomotive crane
20 ton Brownhoist locomotive crane
10 ton 4-wheel electric locomotive crane
100 ft. boom steam Whirley
1-yd. Marion steam crawler shovel

MACKINTOSH ENGINEERING CO.
2907 Library Ave., Cleveland 9, Ohio

FOR SALE
DRAGLINE BUCKETS

2—⅝ cu. yd. Type AU Light Weight Dragline Buckets.
1—1 cu. yd. Type AU Light Weight Dragline Bucket.
3—1¼ cu. yd. Type AY Heavy Duty Dragline Buckets.
1—1¼ cu. yd. Type AX Medium Duty Dragline Bucket.
1—4½ cu. yd. Type AX Medium Duty Dragline Bucket.

BUCYRUS-ERIE COMPANY
Parts Department
South Milwaukee Wisconsin

FOR SALE

WRENCHES

1 with 4½" opening, 3'6" long, very heavy "Williams" like new.
1 3½" opening, 2'10" long heavy "Williams" like new.
1 3½" opening, 2'10" long, all like new. "Williams".
1 3¾" opening, 3'8" long heavy hand forged.
1 3¼" opening, 2'6" long, heavy hand forged.
1 2" opening, 2'8" long, heavy "Williams."
1 2¼" opening, 2'8" long, heavy "Williams."
1 1¾" opening, 16" long, heavy "Williams."
Also a lot of solid pipe dies and stocks up to 3" pipe size.
One 1" Metropolitan injector complete—never unboxed.
One 1 pint Detroit sight feed lubricator, complete—never unboxed.
Several 2½" flue rollers and beaders, hand ratchets and drills.
One factory rebuilt 3" "Kunkle" safety valve.
Box 3047

FOR SALE

2 shovel type motor-generator sets GE good condition, consisting of AC motor, two DC generators and exciter. Location Midwest.
Box 3050

FOR SALE

Low Bottom Equipment Trailers. One 20-ton 8 wheel semi-trailer. One 40-ton 16 wheel semi-trailer; one rubber tired bulldozer. 422 Chestnut Street, Reading, Pa. Phone 6417

FOR SALE

Crusher, portable Jefferys Hammermill model 20x30 type A serial No. 1529, 1938 Hercules engine type O No. 25469 35 HP mtd. on solid rubbered trailer $1400.00
Box 3059

FOR SALE

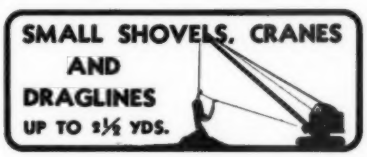
Dipper handle, 15-foot, for Bucyrus-Erie Model 1030 or 1035 rope crowd shovel. Brand new. Immediate shipment. Leland Equipment Co., 12 N.W. 13th St., Oklahoma City, Okla.

FOR SALE

One Link Belt Crawler Crane—Model K1 Number 934—Climax Motor—40 ft. boom. Capacity ¾ yard.
Box 3055

FOR SALE

5 New, Goodyear, earthmover tires and tubes at cost.
3 size 1600-20; 2 size 1400-20. 16 Ply. Box 3054



FOR SALE

¾ Combination Steam Crane. Bucyrus-Erie Type B. New flues. Perfect condition.
¾ Bucyrus-Erie Type B Shovel. New flues. Perfect condition.
No. 60 Caterpillar, equipped with bulldozer. Located in Detroit.
Box 3060

BARGAINS

Shovel and backhoe ½ yd. An exceptionally good little shovel Bay City Model 20 for sale in Pennsylvania. A real buy.

3 yd. shovel exceptionally suitable for coal tripping. Bucyrus-Erie 80-B steam long boom and dipper stick. Located in Kentucky.

1½ yd. crane and shovel, Lorain 75-B in Connecticut. If you need a real good machine, inspect at once this Lorain with 75' crane boom. 60 day guarantee.

1½ yd. shovel and dragline. The well-known Browning shovel in excellent condition and an ED-7 Caterpillar tractor and bulldozer for sale in West Virginia. Act promptly.

¾ yd. good crane at a bargain price. Byers Model 10. ¾ yd. clamshell bucket—dragline attachments. $3950.00. Iowa location.

Two shovels—one ¾ yd. and one 1 yd. at bargain prices. 1 yd. is Northwest 105, good condition, $5300. ¾ yd. is a Thew Lorain serial 2900 with Waukesha gas engine, only $4400.00. Oklahoma location.

Two Large Northwest **draglines** for sale. **One Model 7—2 yds.** 80' dragline boom. **One Model 8**—60' boom, 32" cats, 2½ yd. dragline. One Louisiana and one New York.

ECONOMY COMPANY, INC.
49E Vanderbilt Avenue, New York 17, N. Y.

WANTED TO BUY

Pile Driver leads, hammer and cap for Manitowoc Speed Crane with 55' boom.
Box 3043

WANTED!

15—20 to 30 cu. yd. Dump Cars, drop-door type

IRON & STEEL PRODUCTS, Inc.
39 years' experience
13474 S. Brainard Ave., Chicago 33, Ill.
"ANYTHING containing IRON or STEEL"

WANTED

STEAM BOILER in good condition, for use on Erie 18B ¾ yard Shovel. Write to Illinois Clay Products Co., Joliet, Ill.

OPERATORS WANTED

Experienced operators wanted for 320-B Bucyrus-Erie Steam Shovel in open pit coal mine. Steady work. Fall Brook Coal Company, Antrim, Tioga County, Pennsylvania.

FOR SALE
Three (3) 1¼ cubic yard
Bucyrus-Erie Type GA-2
Combination Machines

Shop numbers 4150, 10269 and 10427 all reconditioned and ready to work, powered with Waukesha Type "WK" 4 cylinder 6¾ x 8 gasoline engines overhauled ready for work. Varying front end attachments available including one standard shovel attachment, one dragshovel attachment and several clamshell, dragline and lifting crane attachments with 40', 45' and 50' booms. Ready for inspection. All located in my yard in Oklahoma City.

Leo Sanders
521 Tradesmen's National Bank Bldg.
Oklahoma City, Oklahoma

Notes from the manufacturers

The Euclid Road Machinery Co., Cleveland 17, Ohio, announces the appointment of Columbia Equipment Co., 1240 S. E. 12th Ave., Portland, Oregon, as their distributor in the counties of Wahkiakum, Cowlitz, Clark, Skamania, and Klickitat in the State of Washington and all counties in Oregon except Wallowa, Union, Baker, and Malheur. Columbia Equipment Co. has a branch office at Seattle, Wash.

R. G. LeTourneau, Inc. of Peoria, Ill., has named Gordon S. McKenty general sales manager to succeed Ed. R. Galvin, sales manager since 1938, who has resigned to accept the presidency of the Tyson Bearing Corp., Massillon, Ohio. Mr. McKenty was a district sales representative, managed LeTourneau's War Department shell contracts, and recently started reorganization of their expanding parts shipping.

Independent Pneumatic Tool Company of Chicago 6, Ill., has named Henry H. Ritchotte manager of the Contractor's Tool Division with headquarters in Chicago. Mr. Ritchotte was manager of contractor tool sales at Philadelphia and formerly was with Johns-Manville Sales Corporation and the H. O. Penn Company.

The Company received its third renewal of the Army-Navy "E" award.

Gar Wood Industries, Inc. of Detroit, Mich., has appointed Clinton W. Wood to the newly created post of vice-president in charge of manufacturing, Alonzo R. Ketcham as production control manager, and Henry Kvindlog, general superintendent of the mechanical division.

Buckeye Traction Ditcher Company of Findlay, Ohio, announces the dealership appointment of the George B. Whitehead Company, 2 Mechanic St., Buffalo, New York. The company will handle the line in more than 20 upstate counties.

POSITIONS WANTED HELP WANTED

Address all box numbers
c/o EXCAVATING ENGINEER
South Milwaukee, Wis.

EXPERIENCED OPERATOR

Shovel, crane, pull shovel and dragline operator. Capacities from ½ yd. to 5 yds. Steam, gasoline, diesel and electric. Can operate Bucyrus-Erie 120-B, Bucyrus-Monighan 5-W, Koehring, Northwest, P&H, Lima and Bay City machines. Also locomotive cranes. Prefer Bucyrus-Erie. 26 years experience. 2 years in South America. Willing to go any place in U.S.A. or South America. Not in the draft. Can overhaul and repair all makes of machines. Now located Wisconsin.
Box 9232

Shovel and Crane Operator

About 45 years' experience on steam, gas, and electric shovels on coal stripping, railroad, state road and quarry work. Married. Willing to go anywhere. Able to make own repairs. Now located in Pa.
Box 9228

TRACTOR EQUIPMENT SERVICE MAN AND DEMONSTRATOR

Must be a good Bulldozer operator, and familiar with operation of tractors and hauling scrapers. Should know welding, and be a good mechanic. Should have a car and be willing to travel. Permanent connection for the right man.
Box 9231

NO Compromise HERE!

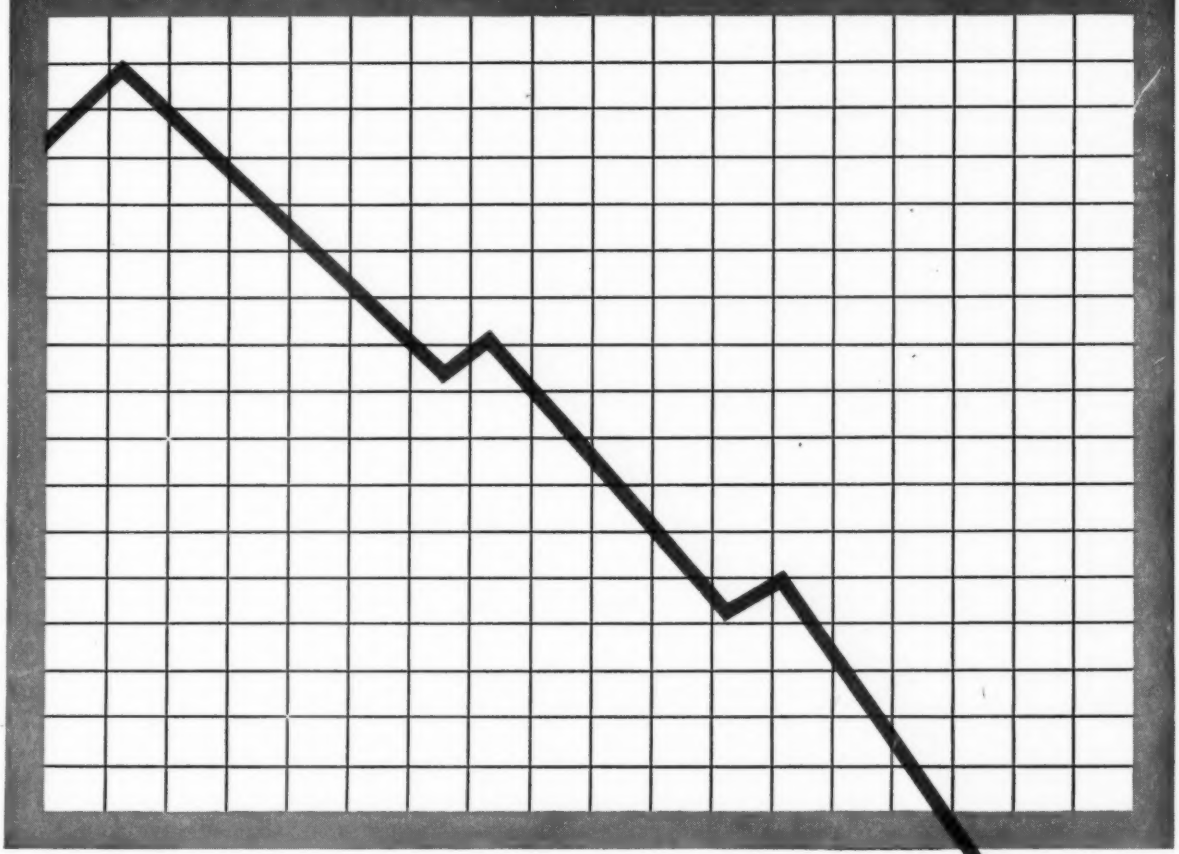
Rear-Dump and Bottom-Dump EUCLIDS are designed and built for a single purpose — to move earth, rock, coal, ore and other materials on off-the-highway hauls with speed and economy. Planetary type full-floating drive axle, greater flotation and tractive power, and heavy construction throughout . . . all of these features make Euclid equipment outstanding for dependable performance and lower hauling costs.

Because they are built exclusively for hauling large loads on difficult hauls, there is no compromise in the design or the construction of Euclids. Weight is kept to a minimum consistent with large capacity and long life on tough jobs. Hundreds of earth moving contractors, and industrial owners too, have proved conclusively that Euclids cost less to own and operate on both long and short hauls.

The EUCLID ROAD MACHINERY Co. · · · Cleveland 17, Ohio

EUCLID SELF-POWERED HAULING EQUIPMENT For EARTH . . ROCK . . COAL . . ORE

WORKMAN ACCIDENT RECORD



JOE MUST HAVE SWITCHED TO *TRU-LAY PREFORMED WIRE ROPE!!*

(Yes — it's safer to handle)

AMERICAN CABLE DIVISION
Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT • CONNECTICUT

ESSENTIAL PRODUCTS...TRU-LAY Aircraft, Automotive, and Industrial Controls, TRU-LOC Aircraft Terminals, AMERICAN CABLE Wire Rope, TRU-STOP Brakes, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Castings, CAMPBELL Cutting Machines, FORD Hoists, Trolleys, HAZARD Wire Rope, MANLEY Auto Service Equipment, MARYLAND Bolts and Nuts, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Steel Castings, WRIGHT Hoists, Cranes . . . *In Business for Your Safety*

First-Class Fighting Machine

TALK to a fighting man back from battle and you'll hear him speak of "Caterpillar" Diesel equipment with affection. He knows that, out there, when they need "workpower" they count on "Caterpillar" Diesels. War dramatizes the dependability of these husky power-plants. For a single power failure may cost lives.

It was in the years before the war on the highways, on construction jobs, in logging camps and oil fields and on farms that "Caterpillar" Diesels matched their dependability against the toughest kinds of jobs that could be found.

Through those years, the men who built them were watching them perform. Owners of "Caterpillar" equipment were urged to give it more and harder work to do. After many thousands of hours of service, engines were torn down and studied. At the first sign of an on-the-job weakness—no matter how slight—"Caterpillar" trouble-shooters went after it . . . *and corrected it!*

So, when the armed forces asked for dependable power, it was just a question of stepping up production of the same machines which had been proved over so many years.

When the war is done, the biggest production of "Caterpillar" Diesel Tractors, Motor Graders, Engines and Electric Sets in all history will be ready to tackle the countless tasks that peace will bring. They won't be streamlined "dream" models, but they will be modern, battle-tested "Caterpillar" Diesels—the same kind that are with our troops around the world today.

Meanwhile, your "Caterpillar" dealer is equipped to render complete and efficient service to help keep your present "Caterpillar" equipment on the job—working at peak efficiency.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR DIESEL

TO WIN THE WAR: WORK—FIGHT—BUY WAR BONDS!